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Deposition of D. Dornbusch

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4512

IN THE DISTRICT COURT FOR THE FIFTH JUDICIAL DISTRICT

WASHAKIE COUNTY, STATE OF WYOMING

IN RE:	)
GENERAL ADJUDICATION OF RIGHTS TO USE WATER IN THE BIG HORN RIVER SYSTEM AND ALL OTHER SOURCES, STATE OF WYOMING.	) Civil No. 4993

FILED 5/20 1981

Margaret V. Hampton CLERK

DEPUTY

DEPOSITION OF DAVID DORNBUSCH

ORIGINAL

January 12 and 13, 1981

APPEARANCES

FOR THE STATE OF WYOMING:	MR. JAMES MERRILL and MR. MICHAEL D. WHITE Special Assistant Attorneys General 2900 Energy Center One Bldg. 717 - 17th Street Denver, CO 80202
FOR THE UNITED STATES OF AMERICA:	MS. REGINA SLEATER Attorney at Law Land and Natural Resources Division Federal Building Cheyenne, WY 82002
FOR THE SHOSHONE AND ARAPAHOE TRIBES:	MR. R. ANTHONY ROGERS Wilkinson, Cragun & Barker 1735 New York Avenue, N.W. Washington, DC 20006
ALSO PRESENT:	MR, CRAIG SOMMERS MR. JIM JACOBS MR. GARY WATTS MR. JEFF FASSETT MR. JAMES MERCHANT

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I N D E X

The deposition of DAVID DORNBUSCH, taken in behalf of the State of Wyoming, pursuant to Stipulation, at the Conference Room, State Engineer's Office, Barrett Building, Cheyenne, Laramie County, Wyoming, on Monday, January 12, 1981, beginning at the hour of 8:15 a.m., before Lamont Miller, Notary Public and Registered Professional Reporter in and for the First Judicial District, State of Wyoming; said deposition being taken pursuant to the Wyoming Rules of Civil Procedure.

* * * * *

P R O C E E D I N G S :

DAVID DORNBUSCH

being previously duly sworn was resworn and testified further, as follows, to wit:

MR. MERRILL: This is a continuation of the deposition of David Dornbusch pursuant to the Wyoming Rules of Civil Procedure.

Regina and Tony, can we proceed under the Stipulation as earlier that all objections, save as to the form of the question, be reserved until such time as the transcript may be used?

MS. SLEATER: Fine with me.

MR. ROGERS: No objection.

EXAMINATION

BY MR. MERRILL:

Q. David, how many times have you testified as an expert witness?

A. Previously? Never.

Q. So you have never testified as an expert witness other than in your earlier deposition in this case?

A. That's right.

Q. Okay. And that's in any kind of proceedings, public utility hearings or public hearings, anything of that sort?

A. That's right.

Q. Okay, how many times have you been called upon to evaluate the economic feasibility of an irrigated agricultural project?

A. Well, I think I noted the number of them, maybe in fact all of them, in my previous deposition.

Q. Okay, could you just run back through this very briefly for me?

A. Well, I'll try to recall them.

Q. Okay.

A. There were a series of irrigated agricultural projects for the Mission Bands in southern California, five Mission Bands.

Q. You're --

A. Excuse me.
Q. Is that work done?
A. That work is finished.
Q. Okay, did you generate a report as a result of that work?
A. We did.
Q. Is it a public report?
A. No, it is confidential.
Q. Okay.
A. We are in the process of -- Let me see. Now, actually, we have completed all of the work -- I'm sorry, I was on another train of thought. We have completed an irrigated agricultural analysis for the Colville irrigation in connection with No Name Creek litigation. And there was no published report in connection with that work.
Q. Was there a report which was entered into evidence in that trial?
A. No, there wasn't.
Q. Okay. And you didn't testify before Judge Neal in that case?
A. I did not.
Q. Okay.
A. I participated in two irrigated agricultural

development projects on Rosebud Sioux and Fort Berthold Reservations.

Q. Is that the study that resulted in your writing a report in 1977 concerning the importance of water to Indian agricultural development?

A. I think that was the date.

Q. Did you write any other report as a result of that study?

A. No, I didn't.

Q. Okay.

A. Those are all the ones I can recall right now that were in the United States, and then there were a number of them overseas and I think I mentioned those in the previous deposition.

Q. Okay, when was the work done for the Mission Bands?

A. It was over a period of about a year, I finished about a year ago.

Q. So roughly, the first of 1980?

A. I finished about, yeah, I think it was. It might have even been earlier.

Q. So you have done the study for the Mission Bands which is completed?

A. Uh-huh.

Q. And you completed your study for Colville concerning No Name Creek?

A. Uh-huh.
Q. Then your study several years ago on the Rosebud and Fort Berthold Reservations?
A. Uh-huh.
Q. Then there is this case?
A. That's right. We've also had to look at irrigated agricultural on some other projects. There was a study for the Corps of Engineers which was examining the alternative uses of water in the Columbia and Snake River Basins, and one of the key uses was irrigated agricultural.
Q. Was agriculture being studied as an existing use or as a proposed alternative use?
A. No, it was as an existing use.
Q. Okay.
A. And a competing use for water in the two river basins.
Q. Okay, did you write any report for that work?
A. I oversaw that work, I did not write a report.
Q. All right, who did?
A. Members of my staff.
Q. Can you describe the report to me?
A. The Corps of Engineers was doing a rather extensive analysis of the water uses in the river basins in the Northwest, Columbia and Snake River

Basins being two of the larger ones. We contributed to that analysis by looking at the economics, the economic impact of competing uses of the water.

Q. How about the report?

A. Can I describe the report?

Q. Yeah, did the Corps publish a work record or did your work become a part of the report?

A. Our work was submitted to the Corps that became part of a larger report, and I can't recall what the title was, I don't think they published it.

Q. Okay.

THE WITNESS: May I take a look at my resumé to refresh my memory?

MR. MERRILL: You bet. Sure.

THE WITNESS: Okay.

(Off-the-record discussion.

THE WITNESS: Well, I forgot to mention the Northern Cheyenne Project, that's still going on, that's not completed; that is a water rights litigation and we are doing the economic feasibility of irrigated agricultural for the Northern Cheyenne Reservation. And I believe those are all the studies that I have performed that were directed in the United States.

Q. (By Mr. Merrill) What projects have you done

outside the United States that relate directly to the feasibility of irrigated agricultural projects?

A. I think just about all of the projects I did outside of the United States relate in the sense that they were looking at economic development feasibility.

Q. Uh-huh.

A. And some of them focused especially on irrigated -- excuse me, on agriculture. Some included irrigated agriculture, but all of them used the kind of approaches and we're looking at the kinds -- well, we're looking at underdeveloped areas, and the kind of methods we were using were, I think, applicable here.

Q. Okay, those were all of the various development projects that you described in the earlier portion of this deposition in San Francisco?

A. Yes, that's correct.

Q. Okay.

A. There was also a project that I did, I believe it's in my resumé, I didn't spot it today, but it should be there, it was back in '70 or '71, that looked at the methods being used by the Bureau of Reclamation and the Corps of Engineers in evaluating multipurpose water resource projects, one of the purposes being irrigated agriculture.

Q. This was a critique or an analysis of the Bureau's methods of determining feasibility?

A. It was an analysis of both the Corps' and the Bureau's methods, and we looked at three hydroelectric development projects -- well, excuse me, they were multipurpose projects but included hydroelectric power in California in order to examine the methods and how they were used in those projects.

Q. I presume that work resulted in a report?

A. Yes, it did.

Q. Would you describe the report?

A. It was a report for the Office of Water Research and Technology. The title I can't recall exactly, but it was something like "Methods of Evaluating Multipurpose Water Resource Projects".

Q. Okay, was that published sometime in '70 or '71?

A. I think it was, yes, it was published, I think it was '70 or '71.

Q. Any other ones you can think of?

A. Not at this time.

Q. Okay, if any of them pop up later in the day, you can always go back.

A. I hope so.

Q. Is it fair to say that a breakdown of the work in

your firm related to this case, the Big Horn Adjudication, has been that you are evaluating the feasibility of the irrigation projects for the irrigation and Jim Merchant is handling the rest?

A. Yes, if by "the rest" you mean municipal, livestock and minerals and industrial, yes, that's correct.

Q. Okay, why don't you elaborate on the breakdown and how that developed in the earlier part of your deposition? Your work was not broken down that way. I would like to know how the work flow developed to where it is now.

A. It seemed like a logical division and there was not an apparent breakdown earlier. We were all participating in developing approaches and digging for data.

Q. Uh-huh.

A. But we soon found that it was going to be unwieldy if I tried to perform myself all of the analyses and run it vertically rather than horizontally, if you understand what I mean.

Q. No.

A. Running it with me and Jim Merchant under me and whatever research assistants we had under Jim and me doing everything, and it was more logical to

split it out by subject, and we did.

Q. So, as I understand it, the opinions that you will give at trial will relate only to the feasibility of irrigated agriculture in this case?

A. That's correct, as I understand it, uh-huh.

Q. Okay, what opinions will you give at trial?

A. Can you be more specific as to what opinions you're talking about?

Q. Okay, let's back up. Have you performed an analysis of economic feasibility of a proposed irrigation plan or system for the Wind River Indian Reservation?

A. Yes, I have performed analyses for proposed irrigation plans on five project areas, and I have completed those analyses.

Q. Okay. And as a result of those analyses, have you formed professional opinions concerning the economic feasibility of those projects?

A. Yes, I have.

Q. What are those opinions?

A. My opinion is that all five are feasible.

Q. Okay, do your opinions relate to the areas known as the North Crowheart and the South Crowheart, Big Horn Flats, Riverton East and the Arapahoe

areas?

A. That's correct, those are the five.

Q. Okay, have you performed any economic analysis of the feasibility of increased irrigation within the FIP's, the Federal Irrigation Projects?

A. I have not.

Q. Okay, have you performed any analysis of increasing the amount of lands in areas served by permits awarded under state law?

A. Well, I have not performed any analyses other than the ones that I have mentioned, the five project areas.

Q. Okay.

A. However, I have provided information to the engineers, and it is not clear to me whether they used this information in connection with their analyses of those other areas other than the five project areas.

Q. So, as you understand it, your feasibility work relates only to the five future areas that are at issue in this case?

A. Well, my specific analyses --

Q. Right.

A. -- for which I derived conclusions as to economic feasibility --

Q. All right. Sure.
A. -- pertain only to those five areas.
MR. MERRILL: I'm sorry, I misspoke myself.
(Brief recess at 8:34 a.m.
MR. MERRILL: Let's go back on the record.
Q. (By Mr. Merrill) Dave, exactly what opinion have you formed about the economic feasibility of the North Crowheart area or a project proposed for the North Crowheart area?
A. Well, as I said before, my opinion is that the project areas are all feasible for new irrigated agricultural development, and that includes North Crowheart.
Q. As a result of your analysis, did you arrive at a benefit cost ratio for each area of irrigating new lands?
A. Yes.
Q. Do you want to tell us what those are, please?
A. Well, I can -- Well, what I can tell you is that they all exceed one and some of them exceed one by greater margins than the others.
Q. Okay, can you tell me the ratios themselves that you calculated?
A. Okay. I'll have to answer this question that I have calculated benefit cost ratios for different

discount rates.

Q. Okay, is that by project?

A. By project area.

Q. Okay. So if we were to put this on a chart, you would have a list of projects down the sides and various discount rates across the top?

MS. SLEATER: No.

Q. (By Mr. Merrill) Would that be a logical way to organize it?

A. Something like that.

Q. Okay, do you have a tabular breakdown of benefit cost ratios by discount rates?

A. I can give you a graphical breakdown. Would that be sufficient?

Q. Sure.

A. You can read the numbers from the graph.

MR. MERRILL: You bet.

Off the record for a moment.

(Off-the-record discussion.

(The instrument hereinafter (described was identified as (Dornbusch Deposition Exhibit (No. 5.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) David, I hand you what has been marked for identification as Dornbusch Exhibit 5.

Would you go ahead and identify that for the record, please?

A. Okay, this is a graph relating the benefit cost ratio to discount rate, and it is for irrigated agriculture project areas for the Wind River Reservation, Wyoming. And the five project areas are the ones named before: Arapahoe, North Crowheart, Riverton East, South Crowheart and Big Horn Flats. On the graph are a series of five curves, although it doesn't show very well, it is too faint because I had sketched in pencil, the intention is to show a continuous curve through four points beginning from a discount rate of 7 1/8 percent and ending at 4 percent. And the points along the curve were only for the intention -- for the purpose of plotting that curve.

Q. Do the curves shown on Exhibit 5 reflect your final opinion concerning the benefit cost ratio of each of these five projects at the discount rates shown?

A. They do.

Q. You do not anticipate changing these ratios before your testimony at trial?

A. I do not.

Q. Okay, on what basis did you decide to graph the

benefit cost ratios only between 4 and 7 1/8 percent discount rate?

A. The 7 1/8 percent discount rate is the one suggested by the Water Resources Council.

Q. Okay.

A. As the discount rate to be used in the economic feasibility of a development project like this. However --

Q. Is that --

A. Yes.

Q. Excuse me. Is that the current rate that is still in use, the 7 1/8?

A. There is a new rate that has come out that is 1/4 of a percent higher at 7 3/8. However, 7 1/8 is the rate that we started using at the beginning of our analysis and standard procedure by the Bureau of Reclamation and others is to stick to the rate that you use when you begin your analysis.

Q. Is that the reason that you chose to stick with 7 1/8?

A. It is.

Q. Is because you started with 7 1/8?

A. That's right.

Q. Okay, I was interrupting your answer earlier.

A. And I forgot what I was saying.

Q. Okay, why don't you start back at the beginning of your economic feasibility analysis and describe first in general terms how you arrived at the benefit cost ratios.

A. We began by making judgments about the types of crops which could be grown in each of the five project areas, estimated the yield which could be obtained in those project areas, the prices which could be obtained for those crops, estimated the crop budgets and all costs relating to developing the irrigated agricultural project and, from the returns and from the costs, estimated the benefit cost ratio using the different discount rates shown on the graph.

Q. Did you make any determination of benefit cost ratio for any discount rate in excess of 7 1/8 percent?

A. No, I did not.

Q. Why not?

A. Because it seemed to me that even 7 1/8 is inappropriately high.

Q. Why is that?

A. And -- Why is that?

Q. Uh-huh.

A. Briefly, there are two ways that you can approach

the analysis in terms of selecting a discount rate. And one is to perform an analysis which uses a discount rate which is fully loaded with inflation; the other is to use a discount rate which is entirely net of inflation. And one, the former, is usually called the nominal rate and the second the real rate. Either one is appropriate for the analysis. However, if you choose one or the other, you also must choose the method for setting your costs and prices. And if you choose a discount rate which is fully loaded with inflation, then you should use prices and costs which also are fully loaded with inflation and project on into the future inflation. If you do not use costs and prices which have inflation; in other words, if the costs and prices do not have inflation, it is then appropriate to use the real rate which is also net of inflation.

Q Uh-huh.

A Seven and 1/8 is neither one nor the other. It is -- it falls somewhere in between.

Q It is too low to account for inflation, but it is too high to be a real rate?

A It is too low to fully account for inflation; it includes quite a bit of inflation in it, but it is

much too high to reflect a real rate.

Q. Do you have an opinion concerning what an appropriate real rate that would be taking into account inflation would be for evaluating the project?

A. Yes, my opinion is that it probably falls in the range of 3 to 4 percent and certainly no higher than 5 percent.

Q. Do you have an opinion concerning an appropriate nominal rate to use?

A. No.

Q. Don't you have your crystal ball with you?

A. It is greater than 7 1/8 percent, but how much greater, I can't say.

MS. SLEATER: If you could say that, we could all go out and get rich.

Q. (By Mr. Merrill) Is it true that the highest rate which you did calculate, 7 1/8 percent, is much lower than the market rate at which money is available for long-term development?

A. No, 7 1/8 is the rate which is intended to reflect the long-term borrowing rate of the government; that's the purpose of that rate.

Q. Is 7 1/8 percent the current long-term borrowing rate of the government?

A. No, it is somewhat higher.

Q. How much higher?

A. I can't recall. But the reason that 7 1/8 does not quite attain that rate is because it is legislated to grow at a limited increase, annual increase, and that increase is limited to a quarter percent so that when the long-term average is higher than whatever current rate is in existence, the rate then increases. If the long-term average is much higher, then they can increase it only up to a quarter percent each year.

Q. In determining economic feasibility, do you have any justification, other than the WRC guidelines, for using a discount rate that is below the current market rate for money?

A. The justification is that the real rate is quite a bit lower than 7 1/8.

Q. And it is your professional opinion that the real rate is 3 or 4 percent and in no event higher than 5?

A. That's right.

Q. Okay, what is the basis for that opinion?

A. A body of literature, a number of experts who have addressed that problem and have reached conclusions as to what the real rate of interest is.

Q. Okay, I'm going to hand you what were marked in

San Francisco as Dornbusch Exhibits 2 and 4 which you identified in the earlier portion of your deposition as a list of sources which you consulted.

A. Uh-huh.

Q. I think you went through that and annotated those with I's and L's and M's and all sorts of things.

A. Yes.

Q. Are the sources on which you base your opinion that the real rate is in the 3 to 4 percent range listed on Dornbusch Exhibits 2 and 4?

A. They are not.

Q. Okay, why don't you describe the sources or, if you have a list, provide a list of the information on which you rely in your opinion that the real rate is 3 to 4 percent?

A. Okay, let me read the sources that I'm using. I'll read the authors and the title, the year of the publication: The first one is Yohe, I believe it is Y-o-h-e, initials W. P. as in Peter, and D. as in David,S. as in Sam, Karnosky, K-a-r-n-o-s-k-y; title is "Interest Rate and Price Level Changes, 1952 to 1969", FRB St. Louis Review, December, 1969. The second one is Ibbotson, I-b-b-o-t-s-o-n, Roger G. and Rex A. Sinkuefield, S-i-n-k-u-e-f-i-e-l-d;

"Stocks, Bonds, Bills and Inflation, the Past: 1926 to 1976, and the Future: 1977 to 2000". Financial Analyst Research Foundation, 1977. Fama, F-a-m-a, Eugene, "Foundations of Finance", Basic Books, 1976. Another reference is not a publication, is the personal opinion of the Director of Market Studies, Federal Reserve Bank of San Francisco; his name is Jack H. Beebe, B-e-e-b-e. That's a personal interview that I had with him. An article in the November 3rd -- I'm sorry, November 13th edition, November 13, 1980 edition of Wallstreet Journal by Paul W. McCracken. And there was some other references that I used for general background, but not for specific rates.

Q. Why don't you go ahead and read those into the record just so we'll have them?

A. Okay, I'm trying to remember the name of the book, it was Charles Howe, I think it is called Economics of Development Projects, and that's all.

Q. The list of sources that you have read into the record are all of the sources on which you rely in forming your professional opinion that the real rate is between 3 and 4 percent, is that correct?

A. Yes. Let me restate to be clear: The real rate may be lower.

Q. Lower than 3 to 4?

A. Yes.

Q. Okay.

A. It is my opinion that it may be lower. It is not clear if or how much it is lower. What I meant to say was that the real rate is no higher than the range of 4 to 5 percent.

Q. Okay.

A. And it is certainly no higher than 5 -- I'm sorry, excuse me. The real rate is probably no higher than the range of 3 to 4 percent and certainly no higher than 5.

Q. Let me make sure I've got this right now.

A. Yes.

Q. It is your professional opinion that the real rate is probably no higher than 3 to 4 percent?

A. Right.

Q. It is also your professional opinion that it is certainly no higher than 5 percent?

A. That's right.

Q. Okay, what information did you get from Mr. Beebe at the San Francisco Branch of the Federal Reserve Bank?

A. It is his opinion that the rate is in the range of 2 to 4 percent and the absolute maximum is 5 percent.

Q. In forming your own opinion, what weight did you ascribe to Mr. Beebe's opinion?

A. Well, I can't say that I gave it a specific rate, but what I found is that the authors that I cited were generally in agreement about the range and some of them felt that it was even lower and that the opinion I have stated really encompasses their collective judgments.

Q. Okay, when you said the authors were in general agreement, is that with the range stated by Mr. Beebe?

A. The range stated by me.

Q. By you?

A. Yeah.

Q. So that all of these folks are in general agreement with the two opinions that you just gave concerning the probable and the certain real rate, is that right?

A. Yes, I believe that's right.

Q. Okay, this is probably a very dumb question, but if the real rate is probably no higher than 3 to 4 percent, why did you not graph on Exhibit 5

benefit cost ratios at discount rates below 4 percent?

A. All of the project areas show clear feasibility at not only 4 percent, but even 5 percent, and it seemed logical to conclude from the trend of the graphs that they would only increase up. In fact, I can state firmly that I would have no doubt that they would increase higher and that the feasibility would look only stronger if I were to continue to graph it beyond 4 percent. But I think you could infer, as I would infer, from the trend in the graphs that they would continue up and would be even more strongly feasible at any rates lower than 4 percent, and I think the point is made.

Q. Okay, in your analysis, I got a little mixed up from our discussion, did you use a real rate or did you use the 7 1/8 percent rate?

A. In my analysis I used 7 1/8, 6, 5 and 4 in order to plot the graphs you see there.

Q. Now, you said earlier that it was your professional opinion that the five projects we are talking about were all economically feasible?

A. That's right.

Q. Is that opinion based on any one particular discount rate or is that opinion sort of meaningless

unless you tie it down to a particular rate that is included in the opinion?

A. Since my conclusion is that the real rate is certainly no higher than 5 percent, I think you can use this graph as a guide to see how I reached that opinion if you look at the 5 percent and less. The region of the graph that is showing 5 percent and lower --

Q. Uh-huh.

A. -- you see that all of the project areas are feasible and that is the basis of my judgment.

Q. So the 5 percent calculations are sort of a touchstone of your opinion that all of these projects are feasible?

A. Five and lower.

Q. Five and lower, okay.

A. It's -- Yes, 5 and lower.

Q. Go ahead if you want to qualify it or straighten me out, go right ahead.

A. No, I wasn't going to qualify it at all; I think it is clear.

Q. Would it be easier to start with the cost side or the benefit side of your work?

A. Your choice.

Q. All right, let's take the cost first.

A. Okay.

Q. In arriving at the benefit cost ratios that are your opinion, what costs did you consider and what numbers did you use for the cost?

A. Okay, I considered on-farm costs.

Q. Uh-huh.

A. That is production costs on the farm. I considered -- and that includes on-farm irrigation and operation, maintenance and repair.

Q. Okay.

A. And I considered system development costs.

Q. What kind of costs would those encompass?

A. The costs for developing all of the facilities and operating facilities to deliver the water to the farms.

Q. That would be the water delivery system, the main canal and that sort of thing?

A. That's right.

Q. Okay, do you have with you some sort of notes or tables that show the various costs and what figures and calculations you used?

A. Yes, I do.

Q. After checking with your counsel, do you want to see if you can turn those over to us?

THE WITNESS: Counsel.

MS. SLEATER: We are all in this together. Give it to him.

THE WITNESS: Okay, here they are, Jim.

MS. SLEATER: Jim, would you mind making a couple of copies of them? He only brought one.

MR. MERRILL: Sure. Off the record.

(Off-the-record discussion.

(The instrument hereinafter (described was identified as (Dornbusch Deposition Exhibit (No. 6.

MR. MERRILL: Let's go back on the record.

Q. (By Mr. Merrill) David, would you please identify Dornbusch Exhibit 6?

A. Okay, are you calling 6 all of the five tables that I gave you?

Q. I had planned to. If you think it would be better to break them down, we can.

A. Fine. No.

There are five tables in this exhibit. The titles are: Table 1: "Crops, Yields, Prices and Gross Returns, Wind River Reservation, Wyoming". Table 2 is "Gross Returns, Production Costs and Net Returns by Crop", also Wind River Reservation, Wyoming. Table 3: "Cropping Pattern, and Weighted Average Annual Net Returns, per Acre, Wind River

Reservation, Wyoming". Table 4: "Net Benefits of Irrigated Agriculture by Project Area, per Acre, Wind River Reservation, Wyoming". And Table 5 is a "Comparison of Economic Costs and Benefits for Irrigated Agriculture by Project Area, Wind River Reservation, Wyoming", and this particular table shows only the benefit cost ratio for the 7 1/8 discount rate. The others are illustrated on the graph I showed you, and this is more to show the representation of how the calculations were made.

Q. So the final benefit cost ratios shown on the right-hand column of Table 5 should agree with the 7 1/8 percent points?

A. They should.

Q. On Dornbusch 5?

A. They should.

Q. Okay. Dave, would you walk us through Deposition Exhibit 6, sort of the logical flow of how the information goes from table to table and what new factors come in and how they are reflected?

A. Sure. Table 1 shows all of the crops that we have included in our estimate of the crops which could be grown on the five project areas. The table shows their yield according to highland and

lowland, price per unit.

Q. Uh-huh.

A. The yield times the price equals what's called here the annual gross returns per acre. Those numbers in the last column are identical to the numbers in the first column of Table 2.

Q. Oh, okay.

A. The totals for each crop that are identical to the first -- the numbers in the first column of Table 2. Table 2 also shows the production costs for each of the crops, gross returns less production costs equal what we call net returns. The numbers shown in the final two columns of Table 2 are also the same numbers shown in Columns 4 and 2 of Table 3, and Table 3 shows a percent distribution, the amount of each crop that would be grown in each of the lowland and highland areas. And by taking the weighted average of net returns, we show weighted average net return highland and lowland. Table 4 shows the percentage of highland and lowland area in each of the five project areas; weighting the highland and lowland net returns by those percentages, we get the average annual net return for each of the five project areas. Then annual on-farm

irrigation operation, maintenance and repair costs are subtracted out from annual net returns to show net benefits, what we call net benefits, per acre by project area. First annual net benefits, the present value is then determined, and here we have used the 7 1/8 discount rate to determine the present value. Those numbers -- those present value numbers in the last column of Table 4 are the same as the first column of Table 5. And Table 5 then compares the net returns to the system development costs present value. Again, for 7 1/8 percent, dividing the net returns by system costs gives you the benefit cost ratio shown in the last column of Table 5.

Q. Are the net returns and the system costs on Table 5 per acre?

A. They are, that's right.

Q. Okay, how did you decide on the five crops that are shown on Table 1, did somebody just say work out the stuff based on these five crops or did you participate in the selection of those crops or what?

A. No, I made the selection of those crops.

Q. How did you make that selection?

A. I selected the crops which I felt would be the

most logical and reasonable crops to be grown in the future in those project areas.

Q. What sources of data did you consult in determining which would be the most logical and feasible crops?

A. I consulted a number of sources which showed what present practice was on and near the reservation, what crops are being grown.

Q. Did you consult any other sources?

A. Well, that includes a number of sources,

Q. Are they listed on Dornbusch Exhibits 2 and 4?

A. They are both published sources and interviews we conducted.

Q. Okay, when did you conduct interviews?

A. Over a period of about a year.

Q. Beginning when?

A. Beginning some months after our contract date and up to just a few days ago.

Q. You've really been going to it.

About how many folks did you interview?

A. I can't recall now. Somewhat -- Quite a number. Quite a few.

Q. Ten or a hundred?

A. More than ten, less than a hundred.

Q. Fifty?

A. I can't recall.

Q. Did you record the interviews on some sort of an interview sheet form?

A. Yes, we have notes on all of the interviews.

Q. Okay, do you have copies of those with you?

A. I have a -- Well, I have a problem here, and that is that a number of the people that I interviewed asked that I not release the information that they gave me as public information.

Q. Would it solve your problem if you were to provide the information in anonymous form, not tying it to a particular interviewee?

A. Well, I think I have in the sense that I have extracted from those interviews and from those published sources what you see here.

Q. Do the interviews or the information you've gleaned from the interviews form any part of the basis on which you determined the crops which should be grown?

A. Could you repeat that question, please?

Q. Yes. Did the interviews form a part of the information base on which you relied in deciding that the five crops shown on Table 1 should be the crops grown in this project?

A. That was part of the base, yes.

Q. Okay, do you want to check with your attorney and

see if you could provide the interview forms? If necessary, white it out or whatever to make the names anonymous.

MS. SLEATER: Jim, if you will provide us forms similarly from your field interviews which you had refused to do previously, we could exchange them possibly. I went over the transcript and it appeared there was some of those we didn't have.

(Off-the-record discussion.

MS. SLEATER: That's what the transcript seemed to reflect. If you represent I have them, that's fine.

MR. MERRILL: I'm not holding anything back. You knew perfectly well during Jim Jacobs' interviews we gave you the forms. We whited out the names.

MR. WATTS: I can represent that you have a copy of everything.

MS. SLEATER: Okay, I was just going over the transcript. It was not clear -- Sure, no problem. You know, we'll just X out the personal information on it.

MR. MERRILL: Okay.

MS. SLEATER: Do we have it in the form that

we can do that?

THE WITNESS: I don't have them as interview forms, I have them as notes.

MR. MERRILL: Okay.

THE WITNESS: But the notes include the names and locations and it isn't a regular sheet that has one form with a name and yield and crops and that sort of thing.

Q. (By Mr. Merrill) Okay, can you go through your notes and white out the name and, if necessary, to preserve anonymity and the location of the interview and leave the rest of your notes intact so that we can see sort of the raw data on which you relied in selecting your crops?

A. It is a big job that I don't relish if that's something that --

MR. MERRILL: That's not much of a factor. We had to do a bunch of that ourselves.

MS. SLEATER: Well, Jim, why don't we, when we break for lunch, I'll go over this stuff with David and we'll talk about it. How is that? I assume you're going to come back after lunch with him.

MR. MERRILL: Can you provide us whited out copies after lunch? I may want to ask some

questions about this.

MS. SLEATER: No, if we can, we will. I don't know the form. He may have an interview form -- he may not have an interview form, but personal notes.

MR. MERRILL: That's what he just said.

MS. SLEATER: You know, we have to see what form they are to see if we can get them whited out by lunch, you know.

Q. (By Mr. Merrill) Okay, so you have relied on these interviews, more than ten, less than a hundred, that you took over a period of roughly a year?

A. Uh-huh, that I and my staff did, yes.

Q. Okay, did you rely on any of the publications listed in Exhibits 2 and 4?

A. Yes, I did.

Q. Okay, do you recall offhand which ones they were?

A. Primarily the "Cost of Producing Crops, Riverton Area, Fremont County, Wyoming, 1974", published in June, 1977 by the Agriculture Extension Service, Laramie, Bulletin 619-R.

Q. That was your primary guide, did you say?

A. That was the primary published guide, yes.

Q. Okay, any other published sources that you used?

State of San Francisco)
: ss
County of San Francisco)

AFFIDAVIT

I, David M. Dornbusch, being first duly sworn, depose and say that the enclosed deposition, given on the 12&13 of January, 19 81, should be corrected and/or amended in the following manner:

FILED # 4993
5/20 19 81
Margaret V. Hampton CLERK
DEPUTY

1. Page 4 Line 15: Change "the"
to read: "a"

2. Page 7 Line 7: Change "arricultural"
to read: "agriculture"

3. Page 22 Line 25: Change "Sinkuefield"
to read: "Sinquefield"

4. Page 25 Line 6: Change "rate"
to read: "weight"

5. Page 54 Line 15&16 Change
to read: "I think it's 1979, rather October '79 through September '80, or fiscal '80."

6. Page 55 Line 11: Change "price"
to read: "practice"

7. Page 58 Line 15: Change "Iimes"
to read: "Iams"

8. Page 58 Line 25: Change "Iimes"
to read: "Iams"

9. Page 59 Line 25: Change "production per acre"
to read: "production cost per acre"

10. Page 72 Line 2: Change "In other words, he has in"
to read: "In other words, in...."

Signed at _____, this _____ day of _____, 19____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19____.

_____
Notary Public

My commission expires _____

State of _____)
: ss
County of _____)

AFFIDAVIT

I, _____, being first duly sworn, depose and say that the enclosed deposition, given on the _____ of _____, 19_____, should be corrected and/or amended in the following manner:

1. Page 82 Line 22: Change "and the size of the areas can be developed using"
to read: "are the size of the areas that can be developed using"

2. Page 85 Line 22: Change "for a '77-79"
to read: "1979 to 1977"

3. Page 90 Line 17: Change "tabbing cross-budgets"
to read: "calculating crop budgets"

4. Page 99 Line 21: Change "Agee's"
to read: "Agee"

5. Page 99 Line 22: Change "suggests, but as an appropriate method as to"
to read: "suggests; it is an appropriate method for"

6. Page 103 Line 14: Change "all unskilled"
to read: "all from unskilled"

7. Page 104 Line 25: Change "not the Federal"
to read: "not from the Federal"

8. Page 109/110 Line 22-25/1-4 Change (The question is unclear as written, but the
to read: answer may stand, as corrected below.)

9. Page 110 Line 5: Change "with and without that"
to read: "with and without the projects."

10. Page 110 Line 10: Change "to employ the Indians."
to read: "to employ the Indians without the projects."

Signed at _____, this _____ day of _____, 19_____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19_____.

_____
Notary Public

My commission expires _____

State of _____)
: ss
County of _____)

AFFIDAVIT

I, _____, being first duly sworn, depose and say that the enclosed deposition, given on the _____ of _____, 19_____, should be corrected and/or amended in the following manner:

1. Page 113 Line 3: Change "are the average, representative"
to read: "are representative"

2. Page 119 Line 4: Change "what's the subzero"
to read: "what's the zero"

3. Page 122 Line 23&24 Change (Unintelligible as written. A sensible question would be as follows:)
to read: "100 years divided by the life of the equipment equals the number of times you would turn it over."

4. Page 125 Line 2: Change "it shows a machine or implement which--"
to read: "it shows the machines or implements which--"

5. Page 126 Line 8: Change "year."
to read: "year,"

6. Page 126 Line 10: Change " Divided"
to read: "divided"

7. Page 136 Line 22: Change " dollar"
to read: "penny"

8. Page 139 Line 20: Change " No, it would be only a category that had"
to read: "No, that would be only an amount based on an"

9. Page 141 Line 13: Change "actual"
to read: "financial"

10. Page 146 Line 24: Change " shop"
to read: "shed"

Signed at _____, this _____ day of _____, 19_____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19_____.

_____
Notary Public

My commission expires _____

State of _____)
: ss
County of _____)

AFFIDAVIT

I, _____, being first duly sworn, depose and say that the enclosed deposition, given on the _____ of _____, 19_____, should be corrected and/or amended in the following manner:

1. Page 146 Line 25 : Change "7 1/8"
to read: "4"
2. Page 147 Line 6 : Change "shed"
to read: "shop"
3. Page 147 Line 11 : Change "$6.76"
to read: "$4.81" (The questions on pp. 146 & 147 only make sense with the changes noted above.)
4. Page 150 Line 21 : ~~Change~~ Remove: "and for the $5.00"
to read: _____
5. Page 157 Line 22 : ~~Change~~ Remove: "grazing"
to read: _____
6. Page 158 Line 8 : Change "are good to malt"
to read: "are good for malt"
7. Page 159 Line 2 : Change "and the corn from grain"
to read: "and the corn grain"
8. Page 166 Line 23 : Change "I have. The"
to read: "I have the"
9. Page 168 Line 7 : Change "side row"
to read: "side roll"
10. Page 168 Line 23 : Change "side row"
to read: "side roll".

Signed at _____, this _____ day of _____, 19_____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19_____.

_____
Notary Public

My commission expires _____

State of _____)
: ss
County of _____)

AFFIDAVIT

I, _____, being first duly sworn, depose and say that the enclosed deposition, given on the _____ of _____, 19____, should be corrected and/or amended in the following manner:

1. Page 169 Line 15: Change "side row"
   to read: "side roll"
2. Page 173 Line 3: Change "side row"
   to read: "side roll"
3. Page 188 Line 15: Change "interviewed somewhat"
   to read: "interviewed varied somewhat"
4. Page 189 Line 3: Change "it was"
   to read: "somewhat"
5. Page 189 Line 23: Change "that's the $50?"
   to read: "that's the $10 to $50?"
6. Page 189 Line 25: Change "quite"
   to read: "quote"
7. Page 199 Line 1: Change "both"
   to read: "'80"
8. Page 199 Line 14: Change "P-205"
   to read: "P_2O_5"
9. Page 200 Line 10: Change "replaces"
   to read: "releases"
10. Page 204 Line 20&21 Change "does not include the prices"
    to read: "is"

Signed at _____, this _____ day of _____, 19____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19____.

_____
Notary Public

My commission expires _____

State of _____)
: ss
County of _____)

AFFIDAVIT

I, _____, being first duly sworn, depose and say that the enclosed deposition, given on the _____ of _____, 19_____, should be corrected and/or amended in the following manner:

1. Page 215 Line 5: Change "and paying $3.00 for"
to read: "and for"

2. Page 225 Line 7: Change "numbers -- oh, there are"
to read: "numbers are"

3. Page 225 Line 9: Change "numbers on Rows"
to read: "numbers in Rows"

4. Page 229 Line 23: Change "at"
to read: "from"

5. Page 230 Line 21: Change "source was corroborated on the figure that I"
to read: "source for fencing costs was" (not otherwise intelligible)

6. Page 230 Line 22: Change "obtained from the BIA, for the cost per mile"
to read: "the BIA. The cost per mile" (not otherwise intelligible)

7. Page 231 Line 3: Change "Guide"
to read: "Service"

8. Page 232 Line 1: Change "Guide"
to read: "Service"

9. Page 232 Line 20: Change "Guide"
to read: "Service"

10. Page 233 Line 4: Change "Multiplied by the miles -- the mile per acre"
to read: "Multiplied the miles per acre"

Signed at _____, this _____ day of _____, 19_____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19_____.

_____
Notary Public

My commission expires _____

State of _____)
: ss
County of _____)

AFFIDAVIT

I, _____, being first duly sworn, depose and say that the enclosed deposition, given on the _____ of _____, 19_____, should be corrected and/or amended in the following manner:

1. Page 243 Line 15 : Change "for all the rows,"
   to read: "for all the"
2. Page 244 Line 7 : Change "investment"
   to read: "investments"
3. Page 248 Line 19 : Change "was on the"
   to read: "was as a"
4. Page 249 Line 25 : Change "was 7 1/8"
   to read: "at 7 1/8"
5. Page 252 Line 9 : ~~Change~~ Add the source promised: "Federal Register, December 14, 1979, Part IX Water Resources Council, Procedure for Evaluation of National Economic Development (NED) Benefits and Costs in Water Resources Planning (Level C) Fin Rul
   to read:
6. Page 253 Line 2 : Change "13.2"
   to read: "13.12"
7. Page 257 Line 16 : Change "nor"
   to read: "not"
8. Page 257 Line 18 : Change "ittigated"
   to read: "irrigated"
9. Page 266 Line 5 : Change "used"
   to read: "moved"
10. Page 270 Line 14 : Change "two times zero"
    to read: "to time zero"

Signed at _____, this _____ day of _____, 19_____.

_____
Deponent

Subscribed and sworn to this _____ day of _____, 19_____.

_____
Notary Public

My commission expires _____

State of CALIFORNIA)
: ss
County of SAN FRANCISCO)

AFFIDAVIT

I, DAVID M. DORNBUSCH, being first duly sworn, depose and say that the enclosed deposition, given on the 12 & 13 of JANUARY, 19 81, should be corrected and/or amended in the following manner:

1. Page 276 Line 1: Change "arithmetic computation for net return from"
   to read: "ratio of net return" (otherwise untillegible)
2. Page 276 Line 2: Change "values to present to present"
   to read: "present value to present" (otherwise untelligible)
3. Page ____ Line ____: Change ____
   to read: ____
4. Page ____ Line ____: Change ____
   to read: ____
5. Page ____ Line ____: Change ____
   to read: ____
6. Page ____ Line ____: Change ____
   to read: ____
7. Page ____ Line ____: Change ____
   to read: ____
8. Page ____ Line ____: Change ____
   to read: ____
9. Page ____ Line ____: Change ____
   to read: ____
10. Page ____ Line ____: Change ____
    to read: ____

Signed at SAN FRANCISCO CALIFORNIA, this 9 day of MARCH, 19 81.

Deponent

Subscribed and sworn to this 9TH day of MARCH, 19 81.

OFFICIAL SEAL
EGIZIO LENCI
NOTARY PUBLIC - CALIFORNIA
CITY AND COUNTY OF SAN FRANCISCO
My Commission Expires October 17, 1984

Notary Public

My commission expires ____

A. Oh, I think there were, I can't recall specifically what they were, but they will be listed in the bibliography.

Q. Okay, did you rely on any unpublished sources that are not listed in the bibliography other than the interviews?

A. Not that I recall, no.

Q. Did you consult with Ron Cummings or Bob Lansford conducting the --

A. I did not consult with them, no.

Q. That means you didn't consult with them at all about anything, or I don't understand what you mean.

A. I did not consult with them about the crop mix, that's right.

Q. Do you have an opinion concerning the crops that are listed on Table 1 as being the most productive or efficient or most suited or any term like that for the five future irrigation projects?

A. Yes, I think that's a good representative mix to be included in an irrigated agriculture feasibility analysis.

Q. Okay, why do you think it is a good representative mix?

A. Because they are the crops that can be grown there,

They are the crops which, as proven out in this analysis, yield a positive benefit cost ratio. Therefore, they are feasible.

Q. In determining the crop mix, did you consider rotating crops over fields to balance the nutrient demands of the crops on the soils?

A. Yes.

Q. Did you consult with anybody about that?

A. Yes, the sources were those that I have mentioned.

Q. Did you talk to Ross Waples of HKM or anybody else over there?

A. I spoke with Ross Waples about a number of things, I can't recall if the crop rotation was one of the things I spoke to him about. It was not his -- his was not a primary input into this, no.

Q. So you wouldn't list him as one of the bases for your professional opinion that these five crops are a good reasonable mix?

A. I would list him as a basis of what crops could be grown, he was one of the sources who stated an opinion as to what crops could be grown, whose opinion I respect. But as to the rotation of the crops, I can't recall that he said anything about rotation or that I included that as a source.

Q. Okay, what crops did you consider other than the

five shown on Table 1 of Exhibit 6?

A. Oh, there were others, I considered some other small grains and sugar beets, and I can't recall all of them, but there were others that were considered.

Q. Why did you reject sugar beets?

A. I believe the primary reason to be rejected was market, insufficient markets.

Q. That there was no local market or that the price was too low?

A. That in combination that there was not a sufficient market to sustain a good sugar beet crop.

Q. Okay, what other crops did you consider and reject?

A. I was --

MR. MERRILL: We can go off the record, if you want.

(Off-the-record discussion.

MR. MERRILL: Okay, back on the record.

THE WITNESS: Back on the record, yes.

A. We considered wheat and oats; we rejected them both. We considered safflowers and sunflowers for seed crops. We considered potatoes, carrots, green beans, peas. There might have been some others, I can't recall all of them.

Q. (By Mr. Merrill) Okay, going down the list you

gave, starting with wheat, tell me why you rejected each of these.

A. As I recall, I don't have complete notes here, but to sum up, their returns were weak relative to the crops we selected.

Q. Is that across the board for this entire list?

A. No, there are different reasons, but generally there were either weak returns or marketing problems or the crops I selected had better returns than the ones rejected.

Q. Why did you reject potatoes?

A. Well, as I recall, there were marketing problems and they were -- I'm trying to remember. I think there were some specialized equipment that was needed just for production of potatoes that would have represented an increase in costs. A lot of the equipment that we used could be used for all of the products shown.

Q. When you say --

A. There might have been some other things, too.

Q. When you say marketing problems, I'm not sure I understand what you mean. Are you saying that there is not a local market or that you would have to ship them so far that the transportation costs --

A. I really can't recall. We rejected potatoes about a year ago, and I don't remember that it was in heavy contention for very long and I didn't dwell on it for very long. There were some evident problems with it. It wasn't one of the products grown in the area. Predominately, we stuck with those for the most part.

Q. To what extent did you rely on actual practice in the area as a guide in selecting the crops that you thought should be grown?

A. That, I think, was our single -- one of our single principal guides.

Q. Okay, was that sort of an acid test in your mind that if somebody were growing a crop in the area that it was to some extent proof of the pudding that it could be done?

A. Uh-huh, yes.

Q. Were there marketing problems with carrots, green beans and peas?

A. Carrots, green beans -- Yes, there were.

Q. So you narrowed down the field to the five crops that are shown on Table 1 of Dornbusch Exhibit 6?

A. We did.

Q. Okay, how did you determine the annual yield per acre for the lowland and highland for these crops?

A. From published sources and interviews.

Q. Are these interviews the same ones on which we were talking about the notes earlier?

A. They are.

Q. So those interview notes will reflect the numbers and the thoughts you got from the folks you interviewed?

A. That's right.

Q. Okay, what published sources did you rely on for the yield?

A. Primarily Bulletin 619-R.

Q. Okay, do the figures in the annual area per acre yield reflect some annual yield over a long period of time or are they the yields that a farmer could expect on a year by year basis?

A. They are the average yields that we believe the farmers could expect, given the conditions in the area and for these project areas.

Q. Would these yield figures include a factor such as crop failure every seventh year, assuming there is one?

A. Yeah, it takes into account what you would expect to have on average.

Q. So this is a very long-term look --

A. That's right.

Q. -- at yields?
A. That's right.
Q. How long a term is it?
A. A hundred years.
Q. In your interviews with folks out in the field, did you talk to people who are actually getting these yields or better or worse?
A. I did.
Q. Does your benefit cost analysis assume that these yields will apply starting with the very first year of production through the entire 100-year life of the project?
A. They do.
Q. David, would it be fair to say that the results of your interviews, if you were to sit down and sort of average out the yields that the folks you talked to were actually getting in the fields, would they be the figures listed in the average annual yield per acre?
A. I think the results of my interviews and those that were conducted and the summation reported in Bulletin 619-R, considering the kind of practices that we believe are possible and attainable, would show these yields, yes.
Q. Are these yields higher than the existing farms as

a general rule are getting right now?

A. Well, they are higher than some and lower than others.

Q. Okay, if you were to average all of them up and compare them to your proposed yield here, would yours be the same, higher or lower?

A. Well, it's -- it would probably fall in between. Some would be higher and some would be lower.

Q. In determining yields you were going to use in your analysis, did you as sort of an intermediate step come up with an average yield that the farmers were getting?

A. No.

Q. Well, how did you deal with all of the information from the interviews? You didn't sit down and average it up and compare that with Bulletin 619 -- What did you do in looking at the interviews?

A. I looked at the yields that -- that were reported in my interviews.

Q. Uh-huh.

A. Giving consideration to the type of farm management practice that the farmer was reporting and his -- and his experience with practice and yields and made a judgment on the basis of that and

combined it with the results that I found in Bulletin 619-R.

Q. Okay, did you find in looking at yield and management practices and years of experience that farmers who have been in business for a long time tend to get better yields and are also the folks who use better management practices?

A. Not necessarily.

Q. Did you find any correlation between experience and yields or management and yields?

A. No, what I meant by experience, I didn't want to just find one farmer who had grown a crop for just ten years once as my sole source of information. I wanted to hear some average over a period.

Q. Did you assume some certain level of managerial expertise for the new areas in projecting yields?

A. Yes, I assumed better than average matters of practice.

Q. Okay, is it true that the management of an irrigated farm entails all kinds of different procedures and practices?

A. Yes.

Q. Did you assume that all of those across the board would be better than average for the new projects?

A. Well, I assumed that the principal ones would be

better than the average experience in the region,
yes.

Q. And what are the principal ones in your view?

A. Irrigation practice and fertilization.

Q. Are your annual yields per acre higher than the yields that are actually being produced in the area right now?

A. Well, in the new irrigation projects there are no -- none of these crops are being grown in those areas, they are all new development projects.

Q. Okay, how about in the areas where you actually surveyed folks?

A. In the regions around those projects.

Q. Uh-huh. Maybe I was using the wrong word.

A. No, I believe these yields are being obtained in the regions that are representative of the new development project areas and, in fact, higher yields are being obtained than these.

Q. Okay, would you characterize these as average yields for the region?

A. As I said, they are, I think, the average yield that could be expected for the better than average farmers.

Q. Okay, how did you determine prices?

A. Oh, these are normalized prices.

Q. What does that mean?

A. It means that the prices we used are not necessarily a specific price as of a given date, but are a price which has attempted to remove cyclical fluctuations over the recent history on the price for that particular product.

Q. Is the term "normalized" synonymous with some sort of averaging?

A. Yes.

Q. Over what period of time did you normalize prices?

A. They are normalized over, I think, the last four years, as I recall.

Q. Which four would they be, '74 to '79?

A. Yes, that's right, '75-'79.

Q. Where did you get your raw data for prices?

A. Some of the data came from the Water Resources Council publications, other through interviews.

Q. Same interviews?

A. No.

Q. When were these other series of interviews conducted?

A. When?

Q. Uh-huh.

A. This fall, perhaps stretching into the winter some.

Q. Okay. So that would be only during the fall and

winter of 1980?

A. I believe so.

Q. Okay.

A. Some of the interviews might have been conducted in the summer of 1980.

Q. Did you make notes as a result of those interviews or did your staff?

A. I did not conduct the interviews.

Q. Did your staff?

A. My staff did not conduct the interviews.

Q. Who conducted the interviews?

A. I thought I said that they were conducted by Bob Carver.

Q. Who is he?

A. He is an agricultural economist, I believe he is the head of the Wyoming Crop and Livestock Reporting Service in Laramie.

Q. What information did you get from Mr. Carver?

A. He gave us the price of malting barley and I believe he actually -- I have to correct an earlier statement. He -- Time passes quickly. He gave us the information at the end of May, 1980.

Q. Oh, okay. Is that all he gave you the price of, malting barley?

A. That's all.
Q. Okay, what price did he give you?
A. He gave us a series of prices.
Q. Okay.
A. Do you want the prices?
Q. Uh-huh. And how they are broken down.
A. Okay, he gave us for 1974, $7.82 per hundred-
weight.
Q. Uh-huh.
A. For 1975, $7.30; for '76, $6.50; for '77, $5.25;
for '78, $5.25.

MR. MERRILL: Off the record.

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) David, how did you get from prices per hundredweight to prices per bushel?
A. I used the weights suggested by the Water Resources Council --
Q. And what weight is that?
A. -- for those years and took a weighted average.
Q. What weights did you use?
A. For 1974, .024; '75, .064; '76, .154; '77, .288; and for '78, .470.
Q. What do those numbers represent?
A. They represent the weights that the WRC feels are

the best method for weighting historic prices to predict a normalized present price.

Q. So you weighed the '74 through '78 price per hundredweight by the weighting factors you just gave me?

A. That's right.

Q. Okay. And what did you come up with for an overall weighted price per hundredweight?

A. I don't recall that, but you can work it backwards from the price per bushel, which we determined to be $2.71 per bushel.

Q. How did you get from price per hundredweight to price per bushel?

A. Well, we used the conversion of bushels to hundredweight.

Q. How many are there in a hundredweight? -- Or if it's the other way around?

A. I believe one bushel is .48 hundredweight.

Q. One bushel is .48 hundredweight?

A. I believe so, I think that's what the division is.

Q. Did you use any other data than the '74 through '78 figures and weighting figures in the conversion factor to come up with the $2.71 per bushel of malt barley?

A. No.

Q. That's it?
A. That's it.
Q. Okay, why don't we move on to nurse barley.
Tell me --
A. It is the same price.
Q. Is it based on the same information?
A. It is.
Q. Okay, it is based on the same analysis?
A. Uh-huh, it is.
Q. Okay, let's go on to alfalfa.
A. Okay.
Q. How did you determine that $52.99 per ton was the price for alfalfa?
A. That is the current normalized price for baled hay for Wyoming.
Q. On what data do you rely for that statement?
A. Water Resources Council.
Q. Any particular publication?
A. I believe this comes from the Federal Register.
Q. That's an awfully big document.
A. Yeah. The date I have is September 14, '79.
Q. Did that document just come out and say this is the current normalized price for baled hay in Wyoming?
A. That's what it did, that's right.

Q. And you just grabbed it and said, "That's fine"?
A. That's right.
Q. Okay, you didn't consider any other sources of information?
A. No.
Q. Would it be possible over lunch to dig up the exact cite or check that date of the Federal Register so we can get to it?
A. Yes, I will do that.
Q. Okay, thank you. How did you arrive at a $5.48 value for an a.u.m. of alfalfa aftermath?
A. Okay, this is the opportunity cost of grazing land. In other words, that's the price that a cattle rancher would have to pay per a.u.m. to graze his cattle, and that's the price we used.
Q. Okay, is that price for a particular region?
A. Yes, I believe that's current price in that region.
Q. And how would you define the region?
A. I can't recall how large it is, but I know -- I believe it applies to the Wind River Reservation.
Q. Okay, where did you get that price of $5.48?
A. It came from the Wyoming Crop and Livestock Report for '78, and that's the source.
Q. Is that the annual report?

A. I think it is. I think so.
Q. So you found the $5.48 in there and adopted it?
A. No, the price published there was $5.39 and we normalized that to current prices.
Q. How did you do that?
A. Using WRC normalization factors, indices.
Q. Are those the same ones you have described earlier for malt barley?
A. No, this was for feed.
Q. Okay, do you have those normalization figures?
A. Yes. It is the ratio of 186 to 183.
Q. What is that ratio for, 1978 to the present?
A. To the present, yes -- to '79.
Q. What did you use as a base year for prices?
A. I think it's 1979, fiscal '79 -- fiscal '80. 1979.
Q. Okay. So you took the $5.39 out of the Wyoming Crop and Livestock Report and normalized it according to the WRC figures, then came up with $5.48?
A. That's correct.
Q. Okay, let's move on to corn silage.
A. Okay.
Q. How did you get $15.90 there?
A. This is using the same procedure that I think is currently in the area as the one that Doug Agee

used in the Bulletin 619 for determining feed value based on the alfalfa price.

Q. Is that a normalized price?

A. Yes, uh-huh.

Q. And how did you normalize that one?

A. It's 30 percent of the alfalfa price which is normalized.

Q. Why 30 percent?

A. That's current practice for determining the value.

Q. How did you determine that that was current price?

A. I used Doug Agee as a source, Bulletin 619-R.

Q. Okay, let's go on to corn grain. Describe how you got $2.55 per bushel.

A. Okay, that comes from the same source as the alfalfa hay price. It's a normalized price for corn grain.

Q. So that one also came straight out of the Federal Register?

A. That's right, it came from the WRC. I'm going to check --

Q. Okay.

A. -- where it was published.

Q. Okay. And you adopted their figure?

A. I did.

Q. Right across?
A. That's right.
Q. Okay. And how about the $13.30 for a.u.m.'s for the aftermath?
A. That's a typo. I don't know how that happened, but it should be the same number as alfalfa aftermath, $5.48.
Q. That was going to be my next question.

Dave, I'll hand you the original of Dornbusch 6 and you can make whatever modifications along the way to that that you think is appropriate.

A. Okay. Well, that's the only one that I've spotted so far.

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) So the a.u.m. price for corn grain aftermath should also be $5.48 per, is that right?
A. That's right.
Q. Okay. And have you marked that correction on the original copy of Dornbusch 6?

You did. It was right here. There it is.

Okay, as a result of that change, do you need to change the figure for annual gross returns per acre?

A. No.

Q. Okay, moving back to the annual yield per acre, I notice that you have two subcategories, lowland and highland.

A. Yes.

Q. What is the break point between those two?

A. Fifty-nine hundred foot elevation.

Q. Who determined that break point?

A. I did.

Q. How did you do that?

A. I used a published source and interviews.

Q. Which interviews are these?

A. Oh, I spoke with various people on and near the reservation who are knowledgeable about crop yield, including farmers.

Q. Is this the same series of interviews you described earlier or is this yet another set?

A. It includes many of those interviews, yes. That's right. All right.

Q. How many folks who you interviewed did you rely on in making your 5900-foot break point?

A. Oh, I can't recall the number, I don't know the number.

Q. Can you estimate a number or was it just two or three or was it quite a few, a couple of dozen?

A. Oh, it was on the order of ten people, plus or minus.

Q. Okay. Did you consult with anybody from agencies of the federal government, such as the BIA or SCS or the Bureau of Reclamation?

A. Yes.

Q. Who did you talk to of those folks?

A. I spoke with Rich Harbour of BIA.

Q. Uh-huh.

A. I spoke with a person from the SCS.

Am I waiting for you or are you waiting for me?

Q. I was waiting for you to tell me who you spoke with at SCS.

A. I believe it was Jack Iimes.

Q. And what did Jack tell you?

A. Well, to put it in perspective, everybody told me different things, and I had to make a judgment about where the break point was.

Q. Okay, were you putting a direct question to those folks where should be a break point or was it more indirectly what crops and how high can you grow them?

A. It was a little of both.

Q. Did Jack Iimes give you his recommendation for a break point?

A. Well, he referred me to a publication, I'm not sure it was a publication, but it was some work that they had done, and he stated an opinion that there was a break point.

Q. Did he state what it should be?

A. Well, he wasn't sure where the elevation was at a fixed point. He said that it fell within a range.

Q. What was the range?

A. I believe it fell somewhat below 5900 feet. I don't recall the range, but I think he was referring primarily to a line that they had drawn on a map and a report which they had published.

Q. Did Jack mention specifically the Big Horn Flats area?

A. I don't recall that he did.

Q. Okay, what did Rich Harbour tell you about the break point?

A. Rich Harbour wasn't sure exactly, but he felt that it was in the range of about 5900 feet, as I recall.

Q. Who else did you speak to about that?

A. Other than the farmers who actually are growing crops higher and lower than that elevation, I don't recall that there were others.

Q. Are the farmers you spoke to about break point a

subset of the first group of interviews? In other words, I want to get the feel of the notes or whatever notes that were made as a result; and if those are included in the first group --

A. Yeah, they are all part of the first group.

Q. Okay, fine.

So the annual gross returns per acre for the lowland and highland on Table 1 of Exhibit 6 are simply the product of yield and the price, is that right?

A. That's right.

Q. Do the annual gross figures represent your professional opinion concerning the gross returns if those crops were grown in the highland and the lowland areas based on a 5900-foot elevation break point?

A. Yes, using normalized prices and using those yields, that's right.

MS. SLEATER: Let's take a short break.

THE WITNESS: Sure.

MR. MERRILL: Okay.

(Recess, 10:25 a.m. to (10:35 a.m.

MR. MERRILL: Okay, let's go back on the record.

Q. (By Mr. Merrill) Dave, do the highland yields reflect some fixed percentage, like 90 percent of lowland yield; how did you come up with the differential between the two?

A. Let's see.

MR. MERRILL: Let's go off the record.

(Off-the-record discussion.

MR. MERRILL: Back on the record.

A. Yes, the high -- excuse me, the lowland yields are 12 percent higher than the highland yields.

Q. Is that true for all three of the crops for which you have both lowland and highland yields?

A. Okay, excuse me. The barley yield and nurse barley yield, the lowland is 12 percent greater than -- that's right, 12 percent greater than the highland.

Q. Uh-huh.

A. The alfalfa highland yield is just 10 percent lower.

Q. Highland yield is 10 percent lower?

A. Than the lowland alfalfa.

Q. Okay.

(Off-the-record discussion.

MR. MERRILL: Okay, back on the record.

Q. (By Mr. Merrill) Dave, for barley, did you calculate the highland yield first and then just add 12 percent to it or did you go the other way around?

A. No, I did the lowland yield first.
Q. Okay, then knocked off a certain percentage?
A. That's right.
Q. To go to highland?
A. That's right.
Q. How did you determine the lowland should be 12 percent higher than highland?
A. Based upon interviews primarily -- well, based upon interviews; I made a judgment as to what the percentage difference ought to be.
Q. Okay. Well, did those interviews concern the yield folks were getting and the elevations at which they were growing crops?
A. That's right.
Q. Okay, is that the same set of interviews we have discussed several times?
A. That's right.
Q. Okay, is that also true for nurse barley?
A. Yes.
Q. All right. Now, how about alfalfa?
A. Yes.
Q. Okay, Dave are you aware that the future irrigation projects have been divided up into four different land classifications based on the suitability of the land for irrigated agriculture?

A. I am.
Q. Did you make any determination of different yields for the different classes of land?
A. I took that into consideration, yes.
Q. Would you please describe how you did that?
A. Through discussions with people who are farming the region and who are knowledgeable about the soil conditions in the regions and the soil classifications and people who are skilled agronomists. I compiled the information from them and made my judgment as to what the expected yields would be.
Q. Did you take -- arrive at any computation of yield by class, in other words, the Class 1 land --
A. I did not.
Q. Would it be fair to characterize these yields then as an average --
A. That's right.
Q. -- for the four classes?
A. It is an average for the soil classifications that we have in the project areas, that's right.
Q. So would it be fair to say that the yield on Class 1 land would be higher than the average on the yield and Class 4 would be probably a little lower?
A. Yes, that's fair.

Q. Okay, tell me who you consulted with about the yield by class and what each of those folks told you.

A. The soils people with HKM --

Q. Uh-huh.

A. -- told me how much of Class 1, 2, 3, 4 soils we have in the project areas.

Q. Uh-huh.

A. The irrigation specialists from Stetson Engineers informed me what their irrigation programs are going to be and their -- I spoke with an agronomist at I believe it is Utah State who told me what I might expect in yields.

Q. Do you remember that person's name?

A. R. J. Hanks.

Q. And what did he tell you you could expect in terms of yield?

A. He told me that with proper irrigation that we could expect the same yield on Class 1 through 3 soils.

Q. Did he say anything about Class 4?

A. He said Class 4 soils would be lower, how much lower depended upon the characteristics of the soils, and I spoke with farmers who were farming soils of this description and they reported yields

to me.

Q. So R. J. Hanks told you that with proper irrigation you could expect the same yield on Classes 1, 2 and 3?

A. That's right.

Q. Did you tell Mr. Hanks the land classification standards that were being used for these projects?

A. I did not explain how the standard -- No, I did not.

Q. Okay, do you know what classes or whose classification standards he was referring to when he spoke of Class 1 or Class 2?

A. I believe that it is a standard classification that --

Q. So you didn't discuss then, you said, any set of classification standards in specific; you just talked about classes of lands?

A. That's right. But --

Q. Okay.

A. -- but I believe it was understood that we were using the type of soil classification system that he used because he had had previous conversations with Woldezion Mesghinna of Stetson Engineers. I was picking up a train of thought that had been started earlier.

Q. The last source, you said, was meeting with farmers?
A. Uh-huh.
Q. Same interviews, I bet.
A. Same ones.
Q. Okay, did you make specific inquiry as to what classes of lands they were irrigating or what yields they were getting off their various classes?
A. No, because I did not expect them to understand what class meant.
Q. You got this information just as part of the overall data from them about their yield that they were getting?
A. No, I asked them what the conditions of their soils were. They described them.
Q. So you got soils descriptions and yields?
A. Yes.
Q. And what did you do with that information?
A. I made a judgment about what yield we could expect given the yield that they had gotten given the soils that they had.
Q. Okay, what specific kinds of questions did you ask the farmers that you interviewed about their soils?

A. I asked them if they had gravelly soils, if they had cobbles in their soils, if they had wet soils.

Q. Did you ask them about the drainage characteristics about their soils?

A. That's what I meant by wet.

Q. Okay, did you ask them about the salinity of their soils?

A. In some cases, yes.

Q. How did you decide when to do that?

A. If they indicated to me that they had -- if they had had saline problems or if they volunteered that that was a condition they had, I asked them about it.

Q. How many folks did you talk to who indicated they had salt problems?

A. Salt problems? I can't recall exactly -- I recall that there were two, three, maybe there were more, with whom I specifically focused on that question.

Q. Okay, how about the number of folks with whom you discussed drainage problems or wet soils?

A. I can't recall. There were two or three of them that indicated they had some areas that were wet.

Q. Okay, did you discuss depth of soil with the folks you interviewed?

A. Yes, a little bit, they had mentioned that as well.

Q. How about soil textures?
A. Yes.
Q. Is there any one soil texture that predominated amongst the folks that you interviewed?
A. No, the question really was when we were looking at cobbly and gravelly soils, they would say, but you understand that it is not just cobbles and gravel, that there are -- it is loam and sandy loam intermixed.
Q. Did you discuss methods of irrigation with the folks you interviewed?
A. In a general sense, yes.
Q. What do you mean by "in a general sense"?
A. We didn't get into specific details of how often or how much they irrigated.
Q. How about, did you talk about whether they were using gravity or sprinkler type irrigation?
A. Generally, I was concerned about whether they thought they were using effective and proper irrigation practices.
Q. Did you take their word for it if they felt that they were, then that was fine?
A. Yes.
Q. Is all of this field information that you got from the interviews the type of data on which a

person of your expertise would reasonably rely in projecting crop yields for a new irrigated area?

A. Yes, I think so.

Q. So you came up with the information based on your interviews and you talked to R. J. Hanks and the folks at Stetson, the folks at HKM?

A. Uh-huh.

Q. Did you consult with any other people or sources of information in projecting the yields shown in Table 1?

A. Yes, I believe I also -- I believe I already mentioned Bulletin 619-R.

Q. Okay, would you characterize any one or more of these sources of information as sort of the predominate one for yield information?

A. Yes, Bulletin 619-R.

Q. Okay. And the rest is sort of supplemental to that?

A. That's right.

Q. Okay, as part of your analysis, Dave, did you ever make a determination of the real price per unit for each of these crops?

A. The real price per unit?

Q. Uh-huh.

A. Could you explain what you mean?

Q. As opposed to the normalized price.

A. No.

Q. Okay, turning to Table 2 in Dornbusch Exhibit 6, please tell me how you arrived at the production costs shown in that table.

A. Okay, I developed a series of crop budgets for each of the crops.

Q. Do you have those budgets here with you?

A. I have, and I would like to present them to you at this time.

MR. MERRILL: Same deal. I need to go make copies.

THE WITNESS: Same deal.

(Off-the-record discussion
(followed by a brief recess.

(The instrument hereinafter
(described was identified as
(Dornbusch Exhibit 7.

MR. MERRILL: Okay, let's go back on the record.

Q. (By Mr. Merrill) Dave, why don't you describe Dornbusch Exhibit 7?

A. Okay, this is a series of five tables; each one is a tabulation of costs of producing each of the five crops noted in the earlier exhibit and showing a total of the production per acre.

Q. Okay, starting with Page 1 for baled alfalfa --
A. Uh-huh.
Q. -- would you describe how you arrived at the list of operations required to bring alfalfa to a finished crop?
A. Yes, these are identical to the operations which Doug Agee in his Bulletin 619-R listed with the exception his is for flood irrigation and mine I have eliminated the flood irrigation operations because we are using sprinkler irrigation.
Q. I don't see any operation.
A. The sprinkler irrigation operations are not -- the costs for those operations are not exhibited here.
Q. Oh, okay. Why did you not include any irrigation event or costs?
A. I did include them; they are just not included on this table. I exhibited them separately.
Q. Oh, where are they?
A. They are, if you refer to the earlier Dornbusch Exhibit 6 --
Q. Uh-huh.
A. -- Table 2 -- I'm sorry, Table 4, the on-farm irrigation operation, maintenance and repair shown there.

Q. Oh, okay. So we'll get to those later.

Okay. So with the exception of the irrigation event, your operations for alfalfa is the same as those listed by Agee in Report 619-R?

A. That's right.

Q. Okay, is that true for all of these crops?

A. It is, yes.

Q. And the exception for irrigation is also true with respect to each?

A. That's correct.

Q. Okay, did you rely on any other source than Report 619-R in your determining the operations?

A. I did not.

Q. You didn't rely on any of your field interviews as to what folks were actually doing --

A. No.

Q. -- or anything like that?

As to each operation, how did you determine what truck or tractor or implement would be required?

A. I relied on Doug Agee's Bulletin 619-R.

Q. Okay, are there any exceptions or modifications?

A. I don't believe so. I think that there was one implement that he noted in his crop budgets that confused me. I think he had a, I believe it was

a cultivator 4-32, which is the equivalent to his cultivator six-row. In other words, he has in his crop budgets, he names a particular piece of equipment, but later on when he lists the equipment, it doesn't appear. And we checked on that, and he said, well, it was the same as this other piece. So you may find one implement that doesn't conform with his. I think that's the one, but it's -- his intention was the same and we used the same implement that he used. In other words, his notation, as I understand it, was not correct in the farm budget, but it is the same implement that he used.

Q. Is there somewhere else in the report a description of the equipment? You're saying that the farm budget list is not right and then something else is?

A. Yes. When we looked at his farm budget, we discovered that comparing the implements that he was using to the list of equipment that he had in the back --

Q. Oh.

A. -- there was one piece that was missing. And when one of my staff asked him about this, he said, well, it's the same as the six-row, I believe it was the six-row cultivator, but I would have to go back and

check to be sure. In other words, we corrected it according to Agee's suggestion.

Q. Okay, did Agee's study also list the exact size and so forth of the equipment that you have on your implement column?

A. They are the same.

Q. Okay, how about the material column?

A. They are the same.

Q. Any exceptions or modifications?

A. To what?

Q. To Agee's Report 619-R?

A. In the --

Q. That you adopted.

A. In the material?

Q. Uh-huh.

A. Let's see. Well, we made some adjustments. For example, our yields -- correction, in consulting with the people designing the project areas, we decided to use different haul distances in some cases because the haul distances might be longer.

Q. So in some cases the haul distances in your crop budgets are greater than those listed in 619-R?

A. That's right.

Q. Okay, going back to the materials column, did you adopt without change Agee's budget for fertilizer?

A. No, in checking with him, he pointed out an error that he had made and we made a correction.

Q. Your 0-100-0 reflects the correction, does it?

A. Well, what budget are you talking about?

Q. Alfalfa. Or was his correction for another crop?

A. It was for another crop, it was for malting barley.

Q. Does your figure for malting barley, the fertilizer, follow 619-R or the corrected?

A. The corrected.

Q. Okay, are there any other cases throughout these crop budgets in which you didn't follow the materials list of the crop budget in the Report 619-R?

A. Well, it is the same situation for malting barley seeded to alfalfa.

Q. Okay, any others?

A. Well, that's the change in the materials column.

Q. Okay, all of the other items that you listed for materials are the same as in Report 619-R?

A. I believe they are, yes.

Q. Okay, describe how you arrived at the numbers shown under truck miles or tractor hours.

A. Excuse me, could I hear that last question repeated, the one to which I answered "yes"?

(The above question and
(answer were read back by
(the reporter as follows:

("Q: Okay, all of the other
(items that you listed for
(materials are the same as in
(Report 619-R? A: I believe
(they are, yes."

Q. Do you want to modify or change your answer, Dave, after hearing that?

A. No.

Q. Okay, do you remember the last question?

A. No.

Q. Okay, how did you arrive at the number shown under the column tractor hours or truck miles?

A. I adopted for the most part Doug Agee's for tractor hours or truck miles.

Q. Same report?

A. Same report.

Q. Do you want to point out the exceptions, it might be a quicker way?

A. They were the same -- Well, it was the thing I pointed out earlier; we probably have some longer hauling distances.

Q. Would that be the only distinction between your numbers and Agee's?

A. That's right.

Q. Okay. Please describe how you determined the number of manhours required for each operation.

A. I'll be right with you. Just a moment.

Q. Okay.

A. I have to make one correction under the materials column. In many cases we are not specifically talking about any material like fertilizer or twine that are applied to the field and used to bale, but it does refer in some cases to the yields because the effort required differs with the yield. And where the yield is different, there is an appropriate change made from what Doug Agee had.

Q. In other words, you would have, for example, a higher materials requirement than he might because you're running a higher yield?

A. That's right, uh-huh.

Q. Can you point out the instances in which that's true?

A. Sure. For barley, the custom charge under the column materials and custom --

Q. Uh-huh.

A. -- is taken off of the materials column, and we used a different yield than Agee did and, therefore, our custom charge came to a different number. That's for both malting barley and malting barley seeded to alfalfa.

Q. Are you referring to the combine operation?

A. Yes.

Q. Okay. And that's a higher cost because you're assuming a higher yield per acre than Doug did?

A. That's right, correct.

Q. Okay, do you recall what yield Agee had shown for malting barley?

A. Yes, he had a yield of 80 bushels to the acre -- I'm sorry, he had a yield of 83 bushels to the acre, I believe, but in his budgets he used 80.

Q. Do you know why that was?

A. I don't know.

Q. Do you assume that the entire crop of an acre could be harvested and sold or did you assume any waste, any loss of the crop in getting it off of the field and prepared for sale?

A. Oh, I suppose there is some waste. I'm talking about the yield that's available for sale.

Q. Well, you said Agee assumed 83 or proposed a yield of 83, but assumed 80 for purposes of crop budget,

A. Yes. And I don't know why. Maybe he was just rounding, I don't know.

Q. Dave, how did you increase the costs under the materials and custom column, just proportionate to the change in yield?

A. No, there is a formula for calculating custom in

Agee's publication, and I just used that formula.

Q. Okay, are there other changes or distinctions between your entries under the material column and Agee's?

A. No.

Q. Everything else is the same?

A. I believe so, yes.

Q. And your tractor hours agree exactly with his figures except that your truck miles might be longer to take into account longer hauling distances?

A. Correct.

Q. In all other respects yours and his would be the same?

A. Correct.

Q. Okay, how did you determine the number of manhours required for each operation?

A. Same. The manhours were increased proportionately with the truck miles; otherwise, they are all equal to Agee's.

Q. Is there an increase in manhours linearly proportional to the change in hauling distance or truck miles?

A. It is proportional, yes.

Q. Okay, how did you determine your truck or tractor

fixed costs?

A. Okay, I used the same equipment as shown in the tables that compares with Agee's, as I said.

Q. Uh-huh.

A. And I determined the costs according to the optimal use of that equipment.

Q. What do you mean by "optimal use of the equipment"?

A. Oh, its most efficient use.

Q. Why did you decide to do that?

A. Because I believed Agee's fixed costs to be not the appropriate ones.

Q. Is that your professional opinion, that his fixed costs are not the appropriate ones?

A. That's right.

Q. On what do you base that opinion?

A. His farm size was 320 acres, and that is not the most efficient size for all pieces of equipment.

Q. Okay, we'll come back to farm size. Now, what do you mean by "most efficient use of equipment"?

A. Well, if you have a piece of equipment and you require a certain number of hours of that equipment, but you arbitrarily limit its use to some level which is less than the hours that the equipment is actually available for use, that's a less efficient use of it.

Q. So did you assume a certain number of hours or average number of hours per week that a tractor would be available?

A. Well, it's hours of machine use that a piece of machinery would be available.

Q. Do you have figures for hours of availability by a machine?

A. Yes.

Q. Can we have those, please?

A. Do you want me to read them off to you?

Q. Sure. Or else, we can Xerox them.

A. Okay, I'll tell you what, I'll just read them off. This is the list -- Let's see. Let me find that list. Ah, here it is. Okay. Pickup truck, 1/2-ton, 6,000 miles; truck, 210 -- 2-ton, excuse me, 7500 miles; tractors, 125-horsepower, 500 hours. The first two numbers were miles, the rest will all be hours. Eighty-horsepower tractor, 500 hours; 30-horsepower tractor, 500 hours; plow, 4-16, 105 hours; roller harrow, 15-feet, 200 hours; 12-foot leveler, 200 hours; 14-foot disk, 130 hours; 12-foot grain drill, 65 hours; bean and corn planter, 65 hours; cultivator, 200 hours; baler, 360 hours; bale wagon, 360 hours; side rake, 130 hours; swather, self-propelled, 360

hours; and 30-foot sprayer, 200 hours, and 8-foot blade, 80 hours.

Q. What do each of these figures for the pieces of equipment represent, is that optimal use per year or per farm unit or what? I'm not understanding you.

A. Yes, that's the optimum use that each piece of equipment can attain.

Q. Is that with reference to a specific period of time?

A. I believe it's the annual use of that equipment, yes.

Q. So the most efficient use of a 1/2-ton pickup would be 6,000 miles a year, is that what you're telling me?

A. Yes, uh-huh.

Q. And so forth, right on down the list?

A. Right, uh-huh.

Q. What's the source of those numbers that you just read off?

A. That's Bureau of Reclamation.

Q. Can you identify it in any more particularity, please?

A. Yes, it is published in their memorandum, "Supplemental Farm Budgets for Harden Unit Reformulation

Report". It is to be attached to the original report of November '77, then I believe the date is February of '78.

Q. Did you make a determination as to what farm size would give the most efficient use of each of these pieces of equipment?

A. I found that I believe it was approximately a 2500-acre farm would do that.

Q. What source or sources did you rely on for that?

A. The same one I cited.

Q. Bureau of Reclamation memorandum?

A. Yes.

Q. Is that stated directly in the memorandum?

A. No, I think that was a calculation that I or one of my staff made using the figures I just gave you, but -- Yeah, that's right.

Q. Is it your professional opinion that the most efficient farm size for these future irrigated projects will be 2500 acres?

A. Let me put it this way: I believe that the project areas that we're talking about developing and the size of the areas can be developed using the most efficient allocation of equipment.

Q. Would the most efficient allocation of equipment be achieved by dividing into farm sizes of a

certain size?

A. No, it is not necessary to divide it, just to use the piece of equipment over the amount of acreage. That would be its most efficient allocation.

Q. Are you envisioning a pool, as it were, of equipment that is drawn on so that -- As I understand it, the most efficient farm size for a 1/2-ton pickup may not be the same as for a tractor.

A. Correct.

Q. So how do you deal with the fact that you have different kinds of equipment, each of which has an optimal size?

A. Just as you suggest, by pooling it.

Q. Did you determine the accomplishment rates of particular pieces of equipment?

A. No.

Q. What costs are included in the fixed costs for trucks and tractors?

A. The price of the equipment,

Q. Is that depreciated over a period of time?

A. In effect, yes.

Q. Did you use the same depreciation schedule or method with respect to each piece of equipment?

A. Each one has its own depreciation rate, but the

method was the same.

Q. Do you have the data and allocations on which you rely to determine the depreciation costs of each piece of equipment?

A. I used the initial price and the salvage price, which Doug Agee uses, and normalized those.

Q. How did you normalize those?

A. Using the normalization indices prescribed by the Water Resources Council.

Q. Okay, would that be the same September, whatever it was, Federal Register publication?

A. No, it's from a reference handbook published by the Water Resources Council.

Q. Would you give us the cites to that, please?

A. January, 1980.

Q. So for every piece of equipment, to determine depreciation, you used Agee's price and salvage values without any change other than normalizing them?

A. Right.

Q. What did you use as a useful life for each piece of equipment?

A. I believe -- Let me check that. Yes, I used the same useful life year that Agee used.

Q. What about method of depreciation?

A. Well, moving a value in time can be approached a couple of ways; depreciation is one way.

Q. Uh-huh.

A. I used the discounting to a present value.

Q. Why did you select that method?

A. I feel it is more appropriate.

Q. Why is that?

A. It's a better economic method.

Q. Well, in what sense, that it is more accurate or --

A. Yes.

Q. Would you describe how you normalized the price and salvage value of a piece of equipment? Are you using a hypothetical of a tractor that cost $50,000 with a salvage value of $5,000? Could you just sort of walk me through how you got that?

A. Yeah, you take the normalized -- I'm sorry, you take the price in the year that Agee gives you his price, which I believe is 1977.

Q. Okay.

A. In order to get the '79 price, you simply multiply Agee's price by the ratio of the normalization factors for a '77-79.

Q. Did you use '79 as your base year for all of the equipment?

A. Yes.

(Off-the-record discussion.

Q. (By Mr. Merrill) Did you also normalize the salvage value of the useful life?

A. I did.

Q. What discount rate did you use to discount your present value?

A. All the ones I showed you.

Q. Okay, that's built into the figures on Dornbusch 5?

A. The same exhibit -- yes, the one -- that's right, that's 5, that's the one.

Q. Okay.

(Off-the-record discussion
(followed by a brief pause.

Q. (By Mr. Merrill) Dave, did you discount these values over a 100-year period back to the present fixed costs?

A. I did.

Q. Okay, did that start in a particular year?

A. Yes, all costs are to '79.

Q. So the fixed costs in each of your crop budgets are present value terms?

A. Uh-huh.

Q. Of 1979?

A. That's right.

Q. Okay, is that also true with respect to the yields and returns on Table 1 of whatever this is, Dornbusch 6, are these all 1979?

A. Yes.

Q. Okay, describe how you arrived at your variable costs for trucks and tractors, if you would, please.

A. These are simply Agee's normalized -- Agee's costs normalized.

Q. Did you normalize these the same as the depreciation using the January '80 handbook?

A. That's right.

Q. Okay, let's go back to fixed costs for a moment. What other items besides depreciation are included in your fixed costs?

A. I didn't use depreciation, I told you. I discounted the purchase price and salvage value and I did not use a depreciation.

Q. Is there another word for that?

A. For what?

Q. For doing that.

A. Discounting.

Q. Discounting, okay.

A. Yes.

Q. Okay, any other fixed costs that are included in

your fixed costs numbers besides discounting numbers?

A. Insurance costs.

Q. Okay, how did you determine insurance costs?

A. That's .6 percent of average value.

Q. Is that per year?

A. That's right.

Q. How did you arrive at that figure?

A. Extension Services use a range of .5 to .6 percent and I chose the higher, .6 percent.

Q. Is that in a particular publication?

A. Oh, I suppose it is. I don't recall the publication, but this is published in the Extension Service publications for a number of states.

Q. Is that a matter of common knowledge among agricultural economists or did you see it in a Wyoming document that -- did you seize upon it that way?

A. I believe I had one of my staff research it and he told me that that was the range used in a number of Extension Services.

Q. Why did you opt for the higher in that range?

A. Just to be conservative.

Q. Okay, what other factors are included in the fixed costs?

A. That's all.

Q. So you just discounted machine costs and insurance?
A. Right.
Q. All right, what costs are included in the variable costs?
A. Oh, all of the variable costs that Doug Agee used from his publication 619-R.
Q. Okay, did you take his whole list without modification?
A. I did.
Q. And then you normalized that according to the WRC guidelines published in the 1980 handbook?
A. I did.
Q. Did you do anything else to variable costs before putting them into columns on Exhibit 7?
A. No, I did not.
Q. Did you normalize these costs as individual items or did you normalize the whole figure at one crack?
A. I used the appropriate normalization factors for each of the items.
Q. In other words, the normalization numbers vary?
A. They do.
Q. So you took each item and then normalized it and then added up all of your individually normalized costs?
A. That's right.

Q. All right. Okay, let's move on to implement fixed costs.

A. Okay.

Q. Were those determined the same way as the truck and tractor fixed costs were determined?

A. They were.

Q. Is there any exception or modification anywhere down the line or was it precisely the same way?

A. The same way. The implements, tractors and trucks were all done the same way.

Q. Okay, does the same hold true for the variable costs?

A. It does.

Q. Now, did you consider the Agee Report 619-R, the one we keep talking about, to be the kind of information which a person of your expertise would rely on in tabbing cross-budgets for a proposed irrigated farming operation?

A. Yes, I do.

Q. Okay, how did you determine the materials and custom costs?

A. These were normalized the same way as I described before. In the case of custom, they were calculated according to the custom formula, which Agee presented, again normalizing them.

Q. Did Agee's report actually give a materials and custom cost by operation by crop?

A. Yes, uh-huh.

Q. So you just took those and normalized them?

A. That's right.

Q. Okay, were his figures 1977 figures?

A. I believe so.

Q. Now, as I understand it, you normalized all of these costs bringing in from 1977 where you relied on 1977--

A. Uh-huh.

Q. -- to 1979, which is your base year for the budgets?

A. That's right.

Q. And, on the other hand, you normalized crop prices for a five-year period from '74 to '79, is that right?

A. Well, yes, I described how I normalized the crop prices.

Q. Okay, as I understand it, tell me if I am wrong, there is a distinction in the method you used in normalizing crop prices and the costs.

A. Okay, the distinction is this: that the normalization operation with respect to crop prices is to eliminate cyclical fluctuations in crop prices. The normalization operation with respect to

equipment and such from one date to the next is really a movement in time. And the normalization factor which is used has the same kind of content as the removal of cyclical fluctuations, and the only reason they look different is the normalization factor, the one factor I used to move fixed costs and variable costs from '77 to '79, is that it contains the same elements of the four-year or five-year weights that I used in the normalization for the crop prices.

Q. So you're saying that the equipment and the other factors that make up your costs --

A. Yeah.

Q. -- don't fluctuate the way crop prices do, so it is necessary only to bring them into line?

A. No, they do. They do, but the normalization factor, which is a composite of those weights, will be different from one year than it is for another year. And that single normalization factor will combine the weights and prices over that four-year history, which is to represent the year we are concentrating on.

Q. But it doesn't do that for prices?

A. It will if you're trying to convert from a price in one given year that is representative of that

year.

Q. Uh-huh. You didn't consider these prices for the five years to be that kind of price?

A. Well, the malting barley prices were not, they were the average price in each year.

Q. Uh-huh.

A. And it included the cyclical fluctuation.and what we were trying to do is take those prices and move it up to a present year, removing the cyclical fluctuations,and all we did was use the weights that are applied, determining the final normalization price. We simply went back and did the operation that the WRC would have done if they were determining a malting barley price.

Q. Okay. As I understand it then, the normalizing data from WRC for the cost of a tractor to get you from '77 to '79 --

A. Yeah.

Q. -- would somehow take into account that smoothing out process that you had to do yourself for the price data, is that right, or am I misstating?

A. Right.

Q. So the normalizing index is that number that you multiply by --

A. Yeah.

Q. -- to get from '77 to '79 takes into account factors other than just inflation and the price of the equipment?

A. Yes. I believe so. I think the attempt is to move the price in time to account for inflation, but its index in each year is to be a representation of prices paid by the farmers for those products.

Q. So would a normalizing number take into account, perhaps, extraordinary demand for farm equipment in one year since the folks are generally paying higher prices?

A. Yeah, I think it would.

Q. So, the distinction, as I understand it, between normalizing costs and normalizing prices is that you had to go back and manually do the price normalizing yourself, taking each year and adjusting it by a certain factor that the WRC gave you, weighting it --

A. Uh-huh.

Q. -- and assigning it some weight in determining present or '79 normalized price?

A. In some cases. As I said, alfalfa and corn grain --

Q. They just gave it to you?

A. -- they just gave it to you. They don't provide

the same service with barley.

Q. Okay. And on the other costs, the fixed and variable costs --

A. Right.

Q. -- that we've been talking of normalizing --

A. Right.

Q. -- they give you sort of prepackaged, if you will, the adjustment figure?

A. Right.

Q. It takes into account not only inflation, but any other extraordinary factors that may have affected the market for that particular good or service?

A. It should, uh-huh.

Q. You relied on the fact that it should, right?

A. That's right. In this case, yes.

Q. Is it reasonable for an ag economist to rely on WRC's normalization numbers?

A. I think an ag economist should adjust according to an index to move his costs through time.

Q. Uh-huh.

A. And where he's normalizing prices, he should also attempt to normalize costs.

Q. Is it reasonable for an ag economist to rely on the WRC figures to normalize his prices and costs?

A. I can't speak for all economists. I can say that

in my judgment this is the most appropriate approach to take.

Q. Well, let's take another tact. Is the WRC data, on which you relied, normalized prices and costs, the type which an agricultural economist would reasonably rely?

A. Yes, I think so.

Q. Okay. So, for your materials and custom costs, you used the costs as described in 619-R and normalized them, is that what you told me before?

A. Yes, uh-huh.

Q. Without any other modification at all?

A. With the modifications that I mentioned before.

MS. SLEATER: Do you want to break for lundh?

Q. (By Mr. Merrill) Would you review for me real briefly the modifications? I should have written them down and I didn't.

A. Sure. Doug Agee had made an error --

Q. Oh, that's right, that's right. Okay. And that was a differential based on different assumed yields, right?

A. No, he had the wrong application rate for fertilizer.

Q. Oh, I thought that correction only went to the materials column. It goes to both?

A. Uh-huh, yes.

Q. Okay, I presume that your harvesting costs were higher than Agee's since you assumed a higher yield per acre, is that true?

A. The harvesting costs higher than Agee's -- Well, I don't have Agee's numbers with me. But where I had a higher yield, they reflect that higher yield, but it is only in one case.

Q. Which case is that?

A. Barley.

Q. So, just to make it simple in my mind --

A. Yes.

Q. -- if you had assumed 100 bushels per acre and Agee assumed 80, you would take Agee's costs and increase it by 25 percent?

A. No.

Q. Then normalize it?

A. I used the formula for the custom operation.

Q. Okay. So you would simply recalculate -- the custom and then normalize it?

A. That's right.

Q. Okay.

A. To be more specific, I normalized first and then recalculated,

Q. Oh, okay, I guess that could make a difference.

MR. MERRILL: Off the record.

(Off-the-record discussion.

Q. (By Mr. Merrill) Okay, are there any distinctions other than harvesting malting barley where you did anything to Agee's figures other than normalizing them?

A. I don't believe so.

Q. Okay. And that, of course, takes into account the changes in the fertilizer that you discussed earlier?

A. Yes.

Q. Dave, in determining the materials and custom costs, custom for spreading fertilizer, did you assume a particular application of fertilizer per acre for each of these crops in question?

A. I assumed the application rate that Agee assumed.

Q. Does this column reading materials and custom, labor,and the left-hand side would be material and the right side would be labor, or how does that work?

A. No, sir, materials and custom, that's one column.

Q. Okay. And the next column is labor?

A. That's right.

Q. Okay, tell me about the labor figures.

A. They are also derived from Agee's labor figures.
Q. I bet you normalized them.
A. I did.
Q. Did you do anything else to them? Did you just take his figures straight across the board and normalize them and that was that?
A. I computed them at their opportunity cost.
Q. Would you tell me how you did that?
A. Well, Agee used a financial cost, and through my analysis I used opportunity costs; that's applied everywhere.
Q. Okay, would you describe the distinction as it applies to labor costs?
A. Well, Agee uses financial costs, which is the actual transfer of dollars.
Q. In other words --
A. But the most appropriate -- this is an economic analysis.
Q. Uh-huh.
A. An economic analysis uses the principal of opportunity costs; in fact, it is something that Agee's suggests, but as an appropriate method as to everybody who deals with the economic approach, and we cost at opportunity costs, meaning we use the costs that reflect the next best use of the resource.

Q. Is it your opinion that that's the appropriate cost standard to use in evaluating the feasibility of a project?

A. Yes.

Q. Why is that?

A. Because we are talking about removing resources that might be used elsewhere.

Q. Uh-huh.

A. And taking them out of use, productive use, elsewhere, to be used on this project, and that is -- it's the principle used by all economists in economic analysis as we used here.

Q. How did you determine the opportunity cost of labor in this case?

A. We estimated the amount of labor which would be displaced from otherwise productive labor.

Q. What was your estimate?

A. Twenty percent.

Q. Then what?

A. Then what what?

Q. Good question. I don't know how to -- steps you would go through to determine the opportunity cost of labor. Did you take the financial cost and multiply it by 20 percent?

A. That's right.

Q. Oh. Well, I didn't know. That was --

A. Normalized.

Q. Okay, where did you get your financial costs?

A. From Agee.

Q. Okay. So the analysis was to take Agee's costs?

A. Uh-huh.

Q. Did you normalize before you --

A. Of course.

Q. And then you took 20 percent of the normalized costs?

A. That's right.

Q. Okay, how did you determine the 20 percent was the appropriate amount of labor that would be displaced from other work?

A. It is my judgment.

Q. Is it your professional opinion?

A. It is my professional opinion.

Q. What is that opinion based upon?

A. It is based upon the amount of labor which would probably be derived from otherwise unemployed -- employed and unemployed people.

Q. Let me see if I understand that concept. You're going to put together a big farm and start working it.

A. Right.

Q. And you're saying that 80 percent of the labor force that would be used on the farm is not going to come from some other employment, but 20 percent will?

A. That's right.

Q. Okay, did you base that on some sort of working statistics or labor statistics of some sort?

A. Yes, it is based upon the level of unemployment on the reservation and the amount from which I felt we could draw those unemployed people to the labor of these projects.

Q. Okay, in your analysis, did you use the 20 percent figure throughout the life, the 100-year life of the project?

A. Yes.

Q. Okay, what is the unemployment on the reservation?

A. I can't recall the exact percentage, but it's quite high.

Q. Do you know where it is reported?

A. I think the BIA has those figures.

Q. Did you rely solely on the BIA statistics in arriving at the 20 percent figure?

A. No, the 20 percent figure is my figure.

Q. Okay, what I'm wondering is how you decided 20 percent, what are the various things you took into

consideration?

A. Oh, the fact that there is significantly high unemployment on the reservation compared with the level of employment that is required on these projects.

Q. Anything else?

A. It's also based upon the WRC approach to employing unemployed labor.

Q. Did this analysis require you to determine the amount of skilled vs. unskilled labor or various degrees and levels of skill?

A. Uh-huh.

Q. Would you describe how you went about that?

A. This labor is all unskilled, this portion.

Q. The whole works?

A. Uh-huh.

Q. So all of the figures under the labor column all represent costs of unskilled labor?

A. That's right.

THE WITNESS: Can I ask a side question off the record?

MR. MERRILL: Sure. Go off the record.

(Off-the-record discussion.

(Recess, 12:11 p.m. to 1:43 p.m.

MR. MERRILL: Ready?

THE WITNESS: Ready.

Q. (By Mr. Merrill) Okay, Dave, I'll hand you what has been marked for identification as Dornbusch Exhibit 8. Would you please identify it?

A. Okay, three of these pages are my own notes from telephone interviews and one of the pages is David May's telephone interviews.

Q. Were all of the interviews that you made of farmers in the region by telephone?

A. Yes.

Q. You didn't do any on-farm interviews?

A. I didn't. I think I characterized David May's interviews as telephone; they were on-farm.

Q. Okay, would you put or somehow identify the page that identifies David's notes that we can tell that they are different from yours?

(Witness complied.

MR. MERRILL: Off the record.

(Off-the-record discussion.

THE WITNESS: Shall we make a correction now on a source?

MR. MERRILL: Sure.

THE WITNESS: Okay, the normalized price for alfalfa I stated incorrectly; it's a WRC agricultural price standard, January, 1980, it is not the Federal

Register.

Q. (By Mr. Merrill) Okay, those are the standards that you mentioned using several different times throughout your analysis?

A. No, wait just a moment. Okay, yes, I beg your pardon, it was the price, the normalized price for alfalfa. I mentioned the source of the $52.99 for alfalfa.

Q. Uh-huh, okay.

A. I might have mentioned it a few times.

Q. You mentioned, I believe, that you arrived at your discounts for fixed costs of equipment, you mentioned January '80 WRC handbook, would that be the same document?

A. The discounts? I'm not -- I'm not sure I know what you mean by the discounts.

Q. You were explaining to me earlier that you didn't depreciate the equipment, farm equipment.

A. Right. Oh, yes.

Q. You said that you took initial price and salvage per Agee.

A. Uh-huh.

Q. And discounted them according to, my notes say, the 1980 WRC handbook.

A. No, I normalized those prices.

Q. Uh-huh.
A. And the normalization indices were from a WRC source.
Q. Oh, okay.
Is that the same source as you just cited for the price for alfalfa or are we talking about several WRC sources?
A. No, it is a different one.
Q. Okay, do you have a cite for the other one?
A. It's called a reference handbook, January '80.
Q. Okay, as I recall in the earlier portion of your deposition last June in San Francisco, you had included in your crop mix both irrigated pasture-land and dry beans?
A. I might have.
Q. I believe you did.
A. Yes.
Q. Can you tell me why each of those was dropped from the crop recommendations?
A. Yes, I dropped irrigated pastureland because of returns. It turned out the returns were low, too low. I dropped dry beans because it is a crop which I feel might displace the growth of some crops elsewhere, and for that reason in an economic analysis you would not take the benefits from

growing that crop because there would be some -- there would be a loss displacement.

MR. MERRILL: Off the record for a moment.

(Off-the-record discussion.

MR. MERRILL: Would you folks like to identify yourselves for the record?

MR. JOHN TROUGHTON: John Troughton and this is Nancy Freudenthal.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) Would you elaborate on your statement about displacement of dry beans? I didn't understand that at all.

A. Yes, in an economic analysis the benefits that you are permitted to include are the net benefits over and above what might be grown and produced elsewhere; and if you are displacing a crop that might be growing in the same region, maybe even on the reservation, then the value is not a benefit.

Q. It is just another way of saying that the market for beans is saturated with all --

A. In the region.

Q. -- all the market can buy in that region?

A. Yeah, that's right.

Q. Okay, we were discussing the labor costs on Dornbusch Exhibit 7, and I mentioned to you right

before we broke for lunch I was going to ask you the total requirement or requirements for the irrigation projects over time, if that's the way you've got them broken down.

A. Well, the assumption is that things don't change with time, to begin with; that the project areas develop initially, have a life of 100 years, and that the skill will stay the same. I have not calculated an exact number of employment, but it is approximately 250-300 people in the project areas.

Q. Would that be the unskilled labor component?

A. That's all labor.

Q. That would include management?

A. Uh-huh.

Q. Okay, so it would be 250 to 300 people, including management, to run a total farming operation in the neighborhood of what, 75,000 acres?

A. It's somewhat less than that, but I think the final figures will have to come from Stetson's people.

Q. Okay, you stated before lunch that you had assumed that 20 percent of the labor costs would come from other sectors where they are employed now, is that right?

A. Yes.

Q. Does that assumption hold true throughout the 100-year life of the project? In other words, you're assuming that 80 percent of the labor would come from otherwise unemployed people?

A. Yes.

Q. Why did you make that assumption?

A. It's part of the analysis of determining how much would come from otherwise unemployed and it is -- the proportion is 80 percent from otherwise unemployed and 20 percent from otherwise employed.

Q. What I'm asking you is why did you choose not to vary that assumption over the 100-year life of the project?

A. It's essentially an analysis based upon what the opportunities are for development on the Wind River Reservation. And my feeling is without the economic development projects that there is very little potential for development and that I would expect the unemployment rate to remain extremely high without these agricultural development projects.

Q. Is this another way of saying that even if the project were to go into full swing and they would be employing 250 or 300 people, then that

wouldn't have enough of an impact on the labor market that it would even at the end of 100 years be diverting more than 20 percent of its labor from other employment?

A. It is essentially with and without that. With the irrigated agricultural projects, you have the potential for being employed during the life of the project. I do not see similar opportunities developing on the reservation or sufficiently near the reservation to employ the Indians.

Q. Okay, Dave, on Dornbusch Exhibit 7 what items would be included in the general miscellaneous costs?

A. These are the overhead expenses.

Q. Such as?

A. Such things as employment benefits, insurance, the kind of overhead items that you need to run an operation like this.

Q. I notice that for some crops you list an item for crop insurance and others you have not.

A. That's right.

Q. Upon what factors did you rely in deciding whether to include a crop insurance cost? For example, malt barley --

A. Right. This is as a result of a conversation I had with Doug Agee on December 24, 1980, and I had

seen the same thing in his budgets and asked him about it, and his response was that that's the appropriate -- those are the appropriate crops to insure.

Q. So did you rely entirely on Doug Agee's crop budgets and comments to you?

A. I did.

Q. Do you think it reasonable for agricultural economists evaluating the feasibility of an irrigated project to rely and agree wholesale on the comments of another agricultural economist concerning the suitability of line item costs, such as crop insurance?

A. Well, I think in this case it is appropriate, yes.

Q. Why in this case?

A. Because of Doug Agee's familiarity with that area.

Q. Okay.

A. And his evident understanding of how to develop crop budgets for these particular crops.

Q. Is Doug Agee regarded as an expert in developing crop budgets for this area of Wyoming?

A. Yes, I think so.

Q. Do you regard him as an expert?

A. Do I regard him as an expert with regard to developing --

Q. Crop budgets.
A. -- crop budgets for that area of Wyoming?
Q. Yes.
A. Yes, I think I would.
Q. Okay. Dave, did you include in your analysis any assumptions concerning occasional losses of crops due to frost, hail, drought, machine error or human error?
A. Yes.
Q. Where are those factors, Dave?
A. They are considered in the yields. That's all part of the consideration in determining the yield that I'm using.
Q. How did you account for those in yields, did you assume one year out of ten?
A. As I said before, this is the average yield that I feel is reasonable to expect into the future.
Q. In determining the average yield, did you investigate the frequency of crop failures --
A. No.
Q. -- due to any of these factors?
How much did you inquire into that in determining yields?
A. I didn't.
Q. Well, tell me how you took it into account then.

I'm getting lost. Did you assume there would be no crop failures?

A. These yields are the average, representative of average yields for the better than average farmers.

Q. Uh-huh.

A. And where crops are partially destroyed or damaged or there is lower yield in some years, there is by the same token higher yields and better production in other years.

Q. Did you make any quantitative analysis of low yield or no yield years and factor them in or did you just assume that every now and then there is going to be a tough year and you'll knock the yield figures down a little bit to account for that?

A. No. As I said, this yield takes into account the tough years and the better years.

Q. How does it do that?

A. By recognizing that they are based upon averages that are taken over a region for representative farm operations.

Q. As I understand it, you didn't assume crop failures of a given frequency or partial crop losses of a certain amount of a given frequency and factor that into your yield assumptions, yield projections?

A. I didn't, no.

Q. Did somebody else?
A. Nobody calculated the probability of failures and provided me with any information like that, if that's what you're asking.
Q. That's what I was asking.
A. Okay.
Q. As part of your investigation interviewing farmers in the region, did you inquire of them as to how often they lose crops due to frost, drought, hail, any of those factors?
A. Yes.
Q. Did you assume a full water supply to meet all of the irrigation requirements every year?
A. Now, that's part of the variation that can occur, but essentially the water supply is part of the picture of better than average and worse than average. It is part of the -- one of the factors that goes into the process of determining an average over the long-term period.
Q. How often did you assume that there would be a less than optimum water supply during a given year?
A. I didn't assume anything with regard to water supply.
Q. Well, I'm still having a hard time on getting a

handle on how you figured the yield. You said you took into account drought, hail, frost and lack of an adequate water supply. Did you do so purely in nonquantitative terms?

A. Yes.

Q. How did you do that?

A. Purely in nonquantitative terms.

Q. How does one factor in these things nonquantitatively?

A. All of the yields that I used are the same yields that Doug Agee uses and they were corroborated by interviews of others, and during the course of those interviews I established that there are factors that may contribute to lower than average yields and higher than average yields. It appeared that the better than average farmers were very likely to consistently attain considerably higher yields than even the ones which Doug Agee presented as a result of his survey on the basis that there were sufficiently higher yields which were being attained today historically over the past ten years and the fact that the farmers had worked that into stating to me what their yields were, that they had adverse conditions during some periods; that the yields that Agee presented, with

the exception of barley, were sufficiently conservative to account for those kinds of things.

Q And in interviewing farmers did you ask them to factor into their own yield estimates to you the years in which they had no crop at all or a portion of a crop?

A No.

Q So might they have been giving you their optimum yield in their best years?

A No, I don't think so because I asked them the range in yields.

Q Dave, what's overhead interest?

A Okay, this -- this is not technically an interest cost. We used that term mainly to be consistent with the presentation that Doug Agee used, but specifically it is a movement in time of income and expense -- well, not income, but in this case expenditures, and it is accounting for the fact that not all of the costs occur at precisely the same time and, therefore, to present the dollar costs in terms of a net present value, this reflects a movement in time of some of the costs to put them at the same time period as the other costs.

Q On what facts and data did you rely in determining

the overhead interest?

A. The fact that if variable costs are incurred over a period of time and the charge here is the charge for moving those costs up to the period of the harvest.

Q. Is that because you're going to have operations performed on the land?

A. I'm sorry, I misspoke. I -- Not to the harvest, but back to the original time at the beginning of the agricultural cycle in the spring.

Q. Can you give me some examples of those kinds of costs?

A. Yes, they are the cash costs in buying fertilizer, for example.

Q. So is there another way of stating the interest on the up front cash costs --

A. Yes, it is on the --

Q. -- that you will not reap the benefits until the harvest?

A. But it is a better method of doing it in a present value calculation.

Q. Okay, how did you determine the exact amounts that you show as overhead interest under the various costs?

A. Okay, they are calculated on the basis of pre-harvest

costs times the discount rate and then again taking half of that, assuming that it is approximately an equal distribution of the cost before and after the period.

Q. What discount rate did you use in that part of the work?

A. In this part of the work, well, we used all four discount rates.

Q. So again, the variable nature of these costs would be reflected in your B-C curves?

A. That's right.

Q. Okay, did you actually go through each pre-harvest operation and determine when it would occur and what the cash outlay would be?

A. No, I just took the -- Well, yes, in a sense, I took all of the activities prior to harvest.

Q. Uh-huh.

A. Added them up.

Q. Okay. And what did you do after you added them up?

A. Multiplied them by one half to account for the distribution.

Q. Uh-huh.

A. And then by the interest rate -- discount rate.

Q. Did you include any of the costs of the actual harvest operation itself?

A. No.

Q. For purposes of determining overhead interest, what date did you discount back to? In other words, what's the subzero time for starting this analysis?

A. I believe it was March.

Q. The 1st of March?

A. Yes.

Q. Now, you say that the overhead interest charge would differ depending on the discount rate you used, is that right?

A. Uh-huh.

Q. What rate was used to arrive at the figures shown on Dornbusch Exhibit 7?

A. Seven? Oh, this is using 7 1/8 percent.

Q. Okay, is that the discount rate that you used throughout the crop budgets wherever a discount rate came into play?

A. In Dornbusch Exhibit 7, yes.

Q. Did you make any assumptions concerning the time of year in which each of these operations would occur?

A. Yes, I think I used the time which Doug Agee shows.

Q. We're ready.

A. I gave the answer.

Q. Okay, did you develop other crop budgets for

discount rates other than the 7 1/8 percent?

A. Yes.

Q. Do you have copies of those with you?

A. Yes.

Next question?

Q. The question is: Can I have copies of your crop budgets for other discount rates?

A. Yes, you may.

These are my only copies.

MR. MERRILL: Your only copies, all right. Holy smoke.

(Off-the-record discussion.

MR. MERRILL: I was going to say I just got a note from Tom Keith saying he gave you some negatives in his deposition a couple of months ago and hasn't gotten them back of photos he took as part of his aesthetics study. He still hasn't gotten them back.

MS. SLEATER; I don't recall off the top of my head. Those weren't the ones we gave back to you?

MR. MERRILL: No, those were Martin's. He was the wildlife guy. This is Keith on aesthetics.

MS. SLEATER: I'll check on them.

MR. MERRILL: The problem is Tom needs those

rascals so he can get his exhibits ready to give to you all this Friday. So if you could look at that, I would appreciate that.

MS. SLEATER: Well, I think that they are -- Some of that stuff should be coming in tomorrow.

MR. MERRILL: Oh, great.

(Off-the-record discussion.

(The instruments hereinafter (described were identified as (Dornbusch Deposition Exhibits (9, 10 and 11, respectively.

MR. MERRILL: Okay, let's go back on the record.

Q (By Mr. Merrill) Dave, are the fixed and variable costs on these crop budgets present values?

A Yes.

Q Okay, can you explain to me how you worked backwards from future stream of costs to get a present value for each cost?

A Well, that's the operation I'm into now. What I'm developing here is an annual cost.

Q Uh-huh.

A Okay. Once this annual cost is determined, I have the future stream of costs; later then I discount that future stream of costs back to the present. It is not in this exhibit.

Q. Okay, so that will be when we get back to Dornbusch 6?

A. Which one is 6?

Yes, that's the one, Dornbusch 6.

Q. My confusion seems to be with determining fixed costs of equipment.

A. Oh, okay.

Q. Why don't you take a piece of equipment and assume a cost and salvage value and walk us through that analysis to get back to the fixed cost, if you would, please.

A. Okay, each piece of equipment has a given life, after which it has a salvage value. At the beginning of the period the investment is the cost of the equipment.

Q. Uh-huh.

A. At the end of the period you recover a salvage value, at the same time invest in a new piece of equipment.

Q. Okay.

A. And this process repeats itself for the 100 years of the project,

Q. Divided by the life of the equipment the number of times you would turn it over?

A. Yes.

Q. I'm with you so far.
A. Then once you have that pattern in mind, you can see that it is a simple procedure to take each of those investments and salvage recoveries and discount them to a net present value using the appropriate discount rate.
Q. Okay.
A. That's what I have done.
Q. Do you have a list or something that shows each piece of equipment and the life you assume for that piece of equipment and the cost and salvage value?

MS. SLEATER: These are for Sandy, except they are my only copy. I mean, they are exactly like what you've got in the depositions except leaving out one of the things --

(Off-the-record discussion.

MR. MERRILL: Let David answer my question and I'll run down and show you.

A. I have a list of each piece of equipment with its initial price and salvage value. Is that what you wanted?
Q. (By Mr. Merrill) Uh-huh. And whatever life you assumed.
A. And the life.
Q. Could we have a copy of that list?

A. Yes. To make it simple, I refer you to the years of useful life. I refer you to Doug Agee's Bulletin 619-R.

Q. Okay.

A. Okay, as for the initial price and salvage value, I can provide you with that.

MS. SLEATER: You're going to have to read that to him. You can't even read that now.

THE WITNESS: But my counsel advises me that it might be easier if I read it to you.

MS. SLEATER: It is not going to Xerox, Jim.

MR. MERRILL: We can give it a try.

THE WITNESS: I would kind of like to try it.

MR. MERRILL: I don't blame you. It is a long list. Sure, let's give it a crack.

MS. SLEATER: If you're just going to Xerox --

THE WITNESS: If you'll excuse me, let me do that.

MR. MERRILL: Okay.

(Off-the-record discussion.

(The instrument hereinafter (described was identified as (Dornbusch Deposition Exhibit (No. 12.

Q. (By Mr. Merrill) Dave, I'll hand you a copy of what has been marked as Dornbusch Deposition

Exhibit 12 and ask you to describe that.

A. Okay, it shows a machine or implement which -- which are included in our crop budgets. Next to each implement is the normalized price and the normalized salvage value.

Q. Which numbers are we supposed to believe?

A. Whatever remains after being crossed out is the number you're supposed to believe.

Q. All right, what other information is shown on the page from which these copies were made?

A. Okay, in order to calculate a new present value, we went through a series of computations, and what's remaining on the page are those computations. So, to attain a salvage value -- the net present value --

Q. Do you want to check with your lawyer to see if you can let us see your computations?

THE WITNESS: Okay.

MS. SLEATER: Let them Xerox it this time.

(Off-the-record discussion.

MR. MERRILL: Thanks.

THE WITNESS: You're welcome.

(The instrument hereinafter (described was identified as (Dornbusch Deposition Exhibit (No. 13.

Q. (By Mr. Merrill) Okay, Dave, take another run at it. Here's Dornbusch Exhibit 13.

A. Okay.

Q. Do you want to identify that one for us?

A. Yes, it contains the same information as its predecessor, 12, plus five more columns. The additional columns are the remaining useful years at the 100th year.

Q. Uh-huh.

A. Divided by useful life for each piece of equipment.

A. The next column is the normalized value for the equipment at the 100th year. Following that is the present value of that 100th year value. Following that is the total present value for the complete periods within the 100-year period.

Q. What do you mean "complete periods"?

A. Some pieces of equipment have remaining life to them at the end of the 100 years.

Q. Okay. And this is the present value of that residual?

A. No, this is the present value of the complete periods up to the last --

Q. Oh, okay.

A. -- short period.

Q. Okay, the final column is the net present value of

that piece of equipment. And really, what is going on, these are just calculation steps leading to the net present value.

Q. Okay. Just so we've got a complete record here, I'll hand you what have been marked as Dornbusch Exhibits 9, 10 and 11 and ask you to identify each of those just so we're clear on that.

A. Okay, Exhibits 9, 10 and 11 are crop budgets for each of the crops that we used in our cropping pattern. They are three different sets, the first set using a discount rate of 4 percent; the second 5 percent; and the third, 6 percent. Beneath it it says 7 1/8, but on the original copy that was in light pencil and the 4, 5 and 6 percent were in red, and you should neglect the 7 1/8.

Q. Okay.

A. It is just using the same format that I used before.

Q. All right. Do Exhibits 9, 10 and 11 reflect your crop budgets for discount rates of 4, 5 and 6 percent respectively?

A. That's right, yes, they do.

Q. Okay, thanks.

Okay, going back to the top of Dornbusch Exhibit 13, why don't we take the first piece of equipment on the list which is a 1/2-ton pickup?

A. Okay.

Q. And take us through the steps that are involved in the calculations in this page and then in taking the present value and putting it under the fixed costs back on your crop budget.

A. Okay. The normalized price is calculated from Agee's purchase price --

Q. Uh-huh.

A. -- times the normalization factor and the same thing for the normalized salvage value. The third column is simply the ratio of the useful life remaining at the last full cycle to complete the 100 years as a fraction of the full useful life.

Q. So, in this case, the useful life of a 1/2-ton truck would be eight years?

A. Right.

Q. And at the end of the 100-year life of the project, you would have been sitting there with a pickup that would have four years to go?

A. That's right.

Q. Okay, good going.

A. The normalized value, the 100-year value, is Column 1 minus Column 2. The remainder times Column 3 plus -- that total quantity plus Column 2. So if you subtracted $821 from $5949 --

Q. Uh-huh.

A. -- you multiply by 4/8, then added to what remains $821, you would get $3385.

Q. Okay.

A. At a discount rate of 7 1/8 percent, net present value of that number is $3.47.

Q. That's discounting backwards 100 years?

A. Right.

Q. At 7 1/8?

A. Right. The next column represents the present value for the complete period up to that 96th year which began that incomplete period.

Q. Okay, how do you figure that one out?

A. Okay, in that case, let's see -- oh, if the useful life is eight years --

Q. Uh-huh.

A. -- there are twelve complete periods.

Q. Okay.

A. Okay, you simply take the investment price at the beginning of each period and the salvage value at the end of each period and discount those to the present, and that's where you get $6974.

Q. So in this case, you would take twelve different future values?

A. Right.

Q. Or would there be thirteen?
A. No, there would be twelve pairs --
Q. Okay.
A. -- of an investment and salvage value.
Q. All right, so you take the investment, subtract out the salvage, which would give you the net cost of cycling into the next one, and that would be eight years down the road after the start of the project?
A. Uh-huh.
Q. So you discount that one back eight years at 7 1/8?
A. Uh-huh.
Q. And the next cycle would be sixteen, so you would discount that one back sixteen years?
A. Right.
Q. Okay, I'm starting to catch on.
A. Okay. And the last column is simply adding up Column 1, which is the initial investment --
Q. Uh-huh.
A. -- Column 5, which is the present value of the last at the tail end.
Q. Uh-huh.
A. And Column 6 -- I'm sorry -- Yes, Column 6, which is the present value of all the intermediate periods.

Q. Okay.

A. And that gives you the total present value of the stream of investments and salvage values for each machine or implement.

Q. Okay, in this case, that would be $12,926?

A. Right.

Q. Okay. Now, how do we get from there to the next place?

A. Okay. Now, we want to annualize and find the fixed hourly costs. To annualize, we just take $12,926 --

Q. Uh-huh.

A. Multiplied by the discount rate, it gives you the annual capital cost. And in the annual insurance cost which is, which as I said this morning was .6 percent of the average machine value, and in this case that's $20.

Q. Okay.

A. The annual fixed cost then divided by the annual miles or hours, depending upon what you're talking about, in this case it is 6,000 miles, gives you the hourly fixed costs, which in this case is 16¢ per hour -- I'm sorry, per mile.

Q. Yeah, I was going to say --

A. It shows you're following me.

Q. Well, more or less.

Okay, how do you get from the 16¢ per mile fixed costs for the truck, 1/2-ton truck, back to the $3.20 fixed cost for the truck under alfalfa? Is that just 20¢ per mile times the sixteen months?

A. Where are you looking, alfalfa?

Q. Uh-huh.

A. Twenty miles? Right.

Q. Yeah. The first page of Dornbusch 7.

A. Yeah. Let me have the calculator. -- Oh, I'm sorry. Yeah, 20 miles times 16¢ is $3.20. I thought you said some other number and I was thinking --

Q. Oh, I may have.

A. Okay.

Q. You never know.

A. I thought you said some other number and I was trying to --

Q. Okay, Dornbusch Exhibit 13 is the calculations for each piece of equipment at 7 1/8, right?

A. That's right.

Q. Okay, do you have similar calculations for 4, 5 and 6 percent discounts?

A. Naturally.

Q. I thought you would.

A. Next question.

Q. You know the next question: Can we have copies?

(Off-the-record discussion.

(Recess, 2:55 p.m. to 3:04 p.m.

(The instrument hereinafter
(described was identified as
(Dornbusch Deposition Exhibit
(No. 14.

MR. MERRILL: Let's go back on the record.

Q. (By Mr. Merrill) Dave, do you have a copy of Dornbusch Exhibit 14 in front of you?

A. Yes.

Q. Do you want to identify that one for the record, please?

A. Dornbusch Exhibit 14 contains the calculations for each of the machines and implements for 4, 5 and 6 percent discount rate.

Q. Are those calculations done the same way as you described earlier for Dornbusch Exhibit 13?

A. They are.

MR. MERRILL: All right. Off the record.

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) Dave, I got lost when we converted from --

A. I hear you, you got lost when we converted.

Q. Dornbusch Exhibit 13 to $12,926 total present value

on the 1/2-ton truck. You multiplied that by your 7 1/8 percent discount rate?

A. I'm sorry. Take me back to where you are again.

Q. Okay, let's see, you've got 14 there?

A. Okay.

Q. Okay, you've got $12,926 --

A. Right.

Q. -- for your present value of the truck. All right, you multiply that times the discount rate, which on this sheet is 7 1/8 percent, right?

A. That's right.

Q. Then what do you do?

A. I added the annual insurance cost.

Q. And that --

A. That gives me my annual fixed cost.

Q. Annual fixed cost? Okay, do you have something showing the calculation of the insurance cost in taking that to an annual fixed cost?

A. Do I have something showing --

Q. Yeah, a table or something that works across to get us from the total present value to the figure we are eventually going to put back on there?

A. Of course, I do.

Q. As a fixed cost?

MS. SLEATER: I was just hoping you would ask.

Q. (By Mr. Merrill) For all different discount rates, all different pieces of machinery?

A. Yes, I do.

Q. And all other cosmic possibilities?

MS. SLEATER: The only problem is you don't know where they are.

THE WITNESS: No, they are all right here.

(Off-the-record discussion.

THE WITNESS: I assume you're asking for a copy?

MR. MERRILL: Yes.

THE WITNESS: There they are.

MR. MERRILL: It was implicit in the original question.

(Off-the-record discussion.

MS. SLEATER: Luckily, he's got it all in his head.

Q. (By Mr. Merrill) Since you have it all in your head, Dave, see if you can get me from the annual fixed cost down to the fixed costs that are shown on Dornbusch Exhibit 7. If you want, we can wait until we get those back.

A. Yeah. The annual fixed cost divided by the annual miles of use gives you the hourly fixed cost.

Q. Or mileage fixed cost in this case?

A. Right.

Q. Okay, you told me what the annual fixed cost was. It was -- the insurance cost was .6 percent of which value?

A. Of average machine value.

Q. All right, how did you determine average machine value?

A. You add purchase price to salvage value and divide by 2.

Q. Oh, all right. And that would be using the normalized figures for purchase price-salvage value?

A. That's right.

MR. MERRILL: I wouldn't expect you to do anything else.

(The instrument hereinafter described was identified as Dornbusch Deposition Exhibit No. 15,

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) David, did you round these to two places?

A. I rounded them to the nearest dollar.

Q. Okay, how about in the case of mileage cost, I get 15.6¢ per mile. Did you round that up to 16?

A. You got 14.6¢?

Q. No, I got 15.6¢.

A. Yes, I rounded it to the nearest penny.

Q. Okay, Dave, I hand you Dornbusch Exhibit 15. Do you want to identify that one, please?

A. This exhibit shows agricultural machinery fixed costs using discount rates of 4, 5 and 6 and 7 1/8 percent.

Q. Okay, going from the crop budgets shown on Dornbusch Exhibit 7 and I believe also 9, 10 and 11, are those machine -- fixed machine costs again discounted at the overall discount rate when you go from the crop budgets to Dornbusch Exhibit 5, which is your graphs of the B-C curves?

A. Repeat that again, please.

(The above question was read
(back by the reporter as follows:
("Q: Okay, going from the crop
(budgets shown on Dornbusch
(Exhibit 7 and I believe also 9,
(10 and 11, are those machine --
(fixed machine costs again dis-
(counted at the overall discount
(rate when you go from the crop
(budgets to Dornbusch Exhibit 5,
(which is your graphs of the B-C
(curves?"

A. The fixed costs are determined in each of the crop budgets.

Q. Uh-huh.

A. And combined with all of the other costs in the crop

budgets. Those represent the production costs for each crop which are subtracted from the gross returns for each crop.

Q. Uh-huh.

A. To give us net returns. Net returns are reduced by the average -- I'm sorry, by the annual on-farm irrigation O, M and R costs.

Q. Uh-huh.

A. To give the project area net benefit. That is then calculated to a present value using the discount rate. That present value becomes the numerator of the benefit cost ratio which is shown in that exhibit. That's the best way I can explain it.

Q. Okay, Dave, do you have with you the calculations on which you computed the overhead interest for each crop by discount rate?

A. No. That was not a calculation I put down on paper.

Q. Oh, okay. What dates did you assume that each operation would be done in determining how much to discount the costs of materials and custom back to the March 1st date that you said you used as the beginning of the cropping year?

A. I assumed the timing shown in Agee 619-R.

Q. Oh, okay. How did you compute the management charge in each of your crop budgets?

A. Okay, management charge is taken as a percentage of the subtotal.

Q. What percent?

A. It's 10 percent of the subtotal and then costed at its opportunity cost.

Q. Okay, I'm looking at Dornbusch Exhibit 7, Page 2, for malting barley.

A. Okay.

Q. And you have a subtotal there of $142.11 --

A. Uh-huh.

Q. -- per acre?

A. Uh-huh.

Q. So you took 10 percent of that?

A. No. The management cost is calculated on the basis of 10 percent of the subtotal, but as a full -- at a number which represents fully costed labor. So I took the $142.11 and adjusted it to show fully costed labor before calculating 10 percent.

Q. Would that be by taking 20 percent of the subtotal?

A. No, it would be only a category that had opportunity cost of labor, the labor category.

Q. Can you walk me through the calculations on that page, malted barley?

A. I added $18.08 to this $142.11 subtotal and subtracted out $4.30 shown for the labor cost.

Q. Okay, where did you get the $18 and some odd cents that you added?

A. That's what labor would be if it was fully costed at 100 percent.

Q. How did you determine that?

A. That consists of adding up all of the labor categories costed at the financial cost of labor fully costed, not using the opportunity cost.

Q. Okay, I see a subtotal labor cost of $4.30. I'm getting lost very quickly.

A. Yeah. Okay, if labor was fully costed, it would have been $18.08, not $4.30.

Q. How do you get to $18.08?

A. If all of the labor items were fully costed at 100 percent of their cost, not taking into account the opportunity cost, they would have totaled 1691, $16.91.

Q. The labor would have at full cost?

A. Yes.

Q. $16.91?

A. Uh-huh.

Q. And what calculations did you do to get that figure?

A. I just explained that; if each of the labor items was fully costed.

Q. Okay, how do you get from the labor costs shown to

a fully costed labor?

A. You add up all of the items in labor --

Q. Uh-huh.

A. -- at its full cost instead of 20 percent of its cost.

Q. Well, would I get the same result by multiplying times 4?

A. Do you mean 5?

The answer is yes, except for rounding.

Q. Okay. So I add that to the $142.11 and then subtract the $4.30?

A. Right.

Q. Which is the actual labor charge being made here?

A. Right.

Q. Okay, and then what?

A. Then you take 10 percent of that.

Q. Okay, that gives me $15.27.

A. Then you take 20 percent of that.

Q. It gives me $3.09.

A. Well, I get $3.12.

Q. I'll take your word for it.

THE WITNESS: I'm ready.

Q. Okay, I just didn't want to interrupt you.

Okay, from the 154 bucks I can see why we multiplied it times 10 percent, because that is

the basis upon which you compute the management fees, right?

A. Uh-huh.

Q. Okay, why do you think -- or multiply the product of that by 20 percent?

A. Opportunity cost.

Q. Is that based on the same assumption you described earlier, that 80 percent of the labor force that would participate in the management is now unemployed?

A. Yes.

Q. Okay. And, in your opinion, is that a reasonable assumption to apply to the management portion of the irrigation system?

A. Yes, it is.

Q. Why is that?

A. Why is that? Because the same rationale as before, that without these types of projects, there is likely to be a continual high unemployment rate on the reservation.

Q. Would the management of an irrigation project like this be considered skilled labor?

A. Uh-huh,

Q. And you assume that four out of every five managers who would come in to work on the project would,

without the project, be unemployed; is that another way of restating the 80 percent assumption?

A. Yes.

Q. As an economist, is it your opinion that four out of five irrigation managers in the region we're talking about are unemployed?

A. It is my feeling that the capabilities required to perform these functions exist within the population of the unemployed Indians and that the 20 percent of the labor force can impart to the remainder the skills necessary.

Q. Are you assuming some sort of an internship program as the project comes up, so to speak?

A. In a sense, I am.

Q. Can you elaborate on that, what it is you are assuming?

A. No.

Q. Obviously I'm -- When you say "in a sense", I'm obviously not saying what you're thinking.

A. Yes, I think that's a reasonable explanation of it.

Q. In your professional opinion, is the method you have just outlined to me for computing management costs a reasonable method for deriving those costs for an irrigation project?

A. Yes, I think it is reasonable.

Q. Okay, are there any other factors that we haven't discussed that go into the computation of management costs of the crop budget?

A. No.

Q. Let's move on to the land and improvements --

A. All right.

Q. -- line item in your cost budgets. First, tell me what factors,other than land, are included.

A. Machine shop and shed.

Q. What kind of machine shop do you have in mind?

A. A shop for the maintenance of machines.

Q. Okay.

A. Used on the farm project.

Q. Would there be one shop for the whole works?

A. The bases for calculating the shop and the machine shed are the same as the other fixed cost items, and you will see on the exhibits which include the other fixed cost items that machine shop and shed are also calculated there.

Q. By golly, you're right.

A. And the procedure is the same to calculate an hourly fixed cost for the machine shop and shed, and that should be on the comparable exhibits which show the hourly fixed costs and the mileage fixed

costs for all of the other equipment and implements.

(Off-the-record discussion.

Q. What levels of use did you assume for the machine shop and the shed?

A. I didn't get the first few words.

Q. What levels of use --

A. What levels of use?

Q. Uh-huh, as to number of hours per year that people would be working in the machine shop.

A. Okay, that's also shown in the exhibit that you have copies of.

MS. SLEATER: Which one?

MR. MERRILL: I'm drowning in paper here.

THE WITNESS: Exhibit No. 15, I believe.

MS. SLEATER: That's the one that looks like this, Jim.

THE WITNESS: And I guess if you can't read it there, it says 320 acres - 320 acres down at the bottom of the page.

Q. (By Mr. Merrill) Right.

A. Okay, where it says "improvements", it says simply dividing the next to the last column by the 320 acres you get the cost per acre.

Q. Why did you use 320 acres?

A. I believe -- Let me check.

Yes, here I referred to Agee, I used the same quantity that he used.

Q. Okay, I'm looking at Page 1 of Dornbusch Exhibit 15, down at the bottom you've got it?

A. This one here.

Q. Yes, that one.

A. All right.

Q. You've got the shop and machine shed shown down at the bottom?

A. Yes.

Q. Let's just take the shop and work our way across the page to the right --

A. Okay.

Q. -- in these calculations just so I've got it in mind before we move on.

A. Okay. The same as was done for the other items, you have a normalized present value.

Q. Uh-huh.

A. Multiplied by the discount rates to get the annual capital cost. Adding in the annual insurance cost gives you an annual fixed cost. Dividing by 320 acres gives you a cost per acre.

Q. Okay. So for the shop, that $1.10 cost per acre at a 7 1/8 percent discount rate --

A. Yes.
Q. -- would be one of the components of the land and improvement costs, is that right?
A. Right.
Q. So there would be $1.10 for that one, and then going from Page 1 of Exhibit 15, $3.16 for the machine shed, would that be another line item in the lands and improvement?
A. That's right.
Q. And with land picking up the balance, it would add up to the $6.76 per acre?
A. Right.
Q. Dave, how did you get normalized present value for the shop and machine shed?
A. I believe I used Agee's price and normalized it.
Q. Okay.
A. Yes --
Go ahead. I'm listening. I'm just looking for some things.
Q. All right, I think we all are.
On each of the pages of Dornbusch Exhibit 15, that's the one right on top there --
A. Right.
Q. -- you've got a fairly long list of farm equipment.
A. Uh-huh.

Q Do those items of equipment comprise all of the equipment that would be needed to run the entire future lands operation, all of the farm equipment?

A. For all of the on-farm operations, yes.

Q Okay, so it is your professional opinion then that the equipment listed on each page of Dornbusch Exhibit 15 is all the equipment that will be required for the on-farm operations of the entire new lands irrigation project, the five different projects?

A. Yes, that's right.

Q Okay. Now, are the costs that you used for present value of the shop and machine shed based on the makeup of equipment that you have described above on the page? In other words, does Agee have a standard shop and machine shed or do those costs vary depending upon how many different tractors you have to take care of?

A. This is a per acre basis.

Q. Uh-huh.

A. And I believe that this will accommodate the equipment that's required.

Q Okay, does the Agee report have a breakdown of the various pieces of equipment in the machine shop?

A. In the machine shop?

Q. Uh-huh.
A. No, he just shows --
Q. Just a machine shop?
A. Machine shop.
Q. Here's what it's going to cost you?
A. Machine shop and shed, that's right.
Q. Okay. Now, I notice that there is some simple subtraction on the front on Dornbusch Exhibit 7 for land and improvements. You used the total charge of $6.76 per acre, $1.10 of that is for the shop?
A. Uh-huh.
Q. $3.16 is for the machine shed?
A. Yes.
Q. That leaves you with $2.50 per acre for land?
A. I don't follow your calculation. What are you subtracting? I get $4.26 for the shop and machine shed, right.
Q. Okay. Now, subtract from that in the $4.26 for land and improvements.
A. Where is that from?
Q. Dornbusch Exhibit 7, Page 1.
A. I think you should look at Dornbusch Exhibit 9.
Q. Oh,
A. Which corresponds to the same 4 percent discount

rate as this exhibit.

Q. Okay.

A. And if you subtracted $4.26 from $4.81, you should get --

Q. Uh-huh.

A. What do you get, 55¢?

Q. I'll tell you in a minute.

A. Okay.

Q. I sure do.

A. Okay. Now, your question?

Q. Fifty-five cents an acre, right?

A. Yes, that's right.

Q. It sounds like a great deal; I'll buy some.

How did you get that number?

A. That's the opportunity cost using the normalized price for leasing grazing land of $5.48 per a.u.m. that you recall from this morning's conversation.

Q. Uh-huh.

A. And the fact that in that country it takes about 10 acres of dry grazing land to provide one a.u.m. and for the $5.00; therefore, $5.48 divided by 10, rounding up, gives you 55¢ an acre.

Q. Is it your professional opinion that 55¢ per acre is a reasonable cost to use for land in determining the economic feasibility of an irrigated

agricultural project like this one?

A. Yes, it is the proper cost to use in this situation.

Q. What other methods could be used to arrive at a land cost?

A. In this analysis?

Q. Uh-huh.

A. The proper method is to use the opportunity value, the opportunity cost or alternative value of that land.

Q. My question is: What other methods are available, what other methods could be used?

A. In an economic determination, none.

Q. Okay, how did you determine that it took 10 acres for an a.u.m.?

A. I believe that's an estimate that we obtained from the BIA people, but I don't recall exactly now. I better check that and let you know tomorrow. I better check my notes.

Q. Okay, is that 10 acres per a.u.m. based on the Indian reservation as a whole or the Big Horn River Basin or just the land proposed to be irrigated?

A. It's the land proposed to be irrigated in the future irrigation project.

Q. It is a fairly site specific estimate?

A. Yes.

Q. Okay, did you get that number from Rich Harbour, by any chance?

A. Let me check my notes for sure. I've got it buried, but I can find out.

Q. I presume that that 55¢ an acre is a normalized price?

A. Excuse me, this is my original copy. This is what I was looking for.

MR. MERRILL: Let's go off the record.

(Off-the-record discussion.

MR. MERRILL: Let's take five.

(Recess, 3:50 p.m. to 3:57 p.m.

MR. MERRILL: Let's go back on the record.

Q. (By Mr. Merrill) Dave, before I forget, let me hand you Dornbusch Exhibit 8, which was quite awhile ago, and have you identify that. I don't think I got it on the record.

A. Oh, yes, uh-huh, these are -- I did this. These are notes from telephone conversations that I had and David May had with farmers in the vicinity of the Wind River Indian Reservation.

Q. Maybe you did. I had that one.

MS. SLEATER: Yeah, because you had him mark the page that was David's.

MR. MERRILL: I'm sorry about that.

THE WITNESS: That's all right.

MR. MERRILL: You're an awfully patient guy putting up with this.

Q (By Mr. Merrill) In putting together your crop budgets, did you allocate any expenses for the overhead of group managing the farm operation? I didn't see anywhere a cost item for field headquarters or offices for the farm managers or any items like that.

A. That's included in the management budget.

Q. Oh, it is?

A. Yes.

Q. Okay, in determining the management costs that you were to charge on your crop budgets, did you assume any particular type of structure of management --

A. No.

Q. -- on the farm units? No? You just said a flat 10 percent looks good to me and let's get on with it?

A. It's -- Yes, that's right.

Q. Okay, let's take a look at Dornbusch Exhibit 6, Table 2, which is where we entered the digression into crop budgets.

A. Uh-huh.

Q. About six hours ago.

On Table 2 --

A. Yes.

Q. -- I started asking you about production costs and you started pulling out crop budgets. Since you have crop budgets for four different rates, I presume you have tables, too, for four different rates or some variant, is that true?

A. It's true.

Q. Uh-huh. Do you want to guess the next question?

A. Do you want to ask about tables?

Q. Sure, you've got Tables 3 to 5 to each table, too, do you?

A. Yes, I do.

Q. Okay, I wish I had known this before the break and gotten it all done.

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) Dave, here are Dornbusch Exhibits 16, 17 and 18. Go to it.

A. Each one consists of four tables, numbered Table 2, 3, 4 and 5. Table 2 is of gross returns, production costs and net returns by crop. Table 3 is cropping pattern and weighted average annual net returns per acre. Table 4 is net benefits of

irrigated agricultural project area per area. Table 5 is a comparison of economic costs and benefits for irrigated agriculture by project. And Exhibits 16, 17 and 18 are for discount rates for 4, 5 and 6 percent respectively.

Q. Okay, let's go back to Table 2, Dornbusch Exhibit 6.

A. Okay.

Q. Which is Tables 1 through 5 for 7 1/8 percent.

A. Uh-huh.

Q. Okay.

A. Yes.

Q. Gross returns for lowland and highland came from Table 1?

A. Correct.

Q. Production costs we've spent the last five hours swimming in.

A. Correct.

Q. Okay. And you have subtracted production costs from the gross returns to get net returns --

A. Correct.

Q. For highland and lowland?

A. Right.

Q. I notice that you didn't differentiate production costs for highland and lowland.

A. That's right.
Q. Is it your professional opinion that the costs of production of each of these crops would be identical regardless of elevation of crop being grown?
A. Yes.
Q. Okay. So where do we go from lowland and highland net returns on Table 2?
A. To Table 3.
Q. And what happens on Table 3?
A. Okay, Table 3 introduces the crop distribution for lowland and highland areas, and we determined a weighted average net return using that percent distribution.
Q. Okay, how did you arrive at the crop mix for the lowland?
A. As we talked about earlier today, I used -- Well, let me restate it: We have already talked about why I selected the crops I have.
Q. Right.
A. The thinking behind the crop mix is as follows: We have on the lowland area a six-year rotation. The first year consists of malt barley as a nurse crop for alfalfa. The next four years is alfalfa, and the last year is a mix of malting barley, corn

silage and corn grain. The highland area does not have any corn grown. The crop mix is first year's nurse crop of malt barley; the next four years, four years of alfalfa; and the last year is entirely malt barley.

Q. So you run a six-year rotation at both elevations?

A. Right.

Q. Who is responsible for setting up the six-year rotation plan?

A. I am.

Q. Okay, do you want to explain how you did that?

A. Yes, alfalfa is really the cornerstone of the crop rotation. I sought to grow a good sized proportion of alfalfa in the crop mix to establish the alfalfa. I use a nurse crop and I selected barley. And in the last year, to rotate off the alfalfa, I used corn in the lowland and in the highland I used malt barley.

Q. Why is alfalfa the cornerstone, as you put it, of the rotation scheme?

A. Two reasons: One of the predominate agricultural activities in the region is livestock grazing.

Q. Uh-huh.

A. And the second is that alfalfa has a very high return.

Q. What influenced your selection of malting barley as a nurse crop to alfalfa?

A. I considered two principal candidates for the nurse crop: oats and malt barley. And malt barley has, of the two, a higher return.

Q. So it was a purely economic selection?

A. Well, in addition to the other factors that -- the conditions are good to malt barley, all the conditions that make the crop possible, in addition to the fact that it is desirable economically.

Q. Okay, were the conditions, by any chance, better for oats than for barley?

A. I don't believe so, no.

Q. Okay, why did you at the end of the fifth year switch to malt barley in the highland and malt barley plus corn grain and corn silage in the lowland?

A. Well, again, the returns for malt barley are very good.

Q. Uh-huh.

A. However, I was advised by an agronomist that it might be a good idea to put corn into the rotation since you would that way have, oh, a good control of primarily root diseases of alfalfa. And I also considered corn to be desirable from a

couple of viewpoints: One, the corn silage is also an animal feed and the corn from grain has a good national market and, so, over a long period has some attractive features for deferring -- or for spreading risk -- minimizing risk, excuse me.

Q. How does it minimize risk?

A. Oh, it has, on occasion, yielded higher returns even than alfalfa.

Q. I don't understand how that minimizes risks.

A. Oh, if it's in the crop rotation, you're putting one more crop on which, if the prices fluctuate against you, can act as some insurance for cutting your lower returns.

Q. Spreading your eggs among several baskets?

A. Right.

Q. Who was the agronomist with whom you consulted?

A. It was R. J. Hanks, the one I mentioned before.

Q. Was your discussion with him limited solely to the composition of the sixth-year crop, independent, or did you talk about the whole rotation scheme with him?

A. I can't recall very well now, but I believe I talked about the whole rotation scheme.

Q. Okay, did you have at that time a specific scheme that you proposed to him for his reaction?

A. No, I believe I gave him some alternatives and asked for his comments about the advisability of the different alternatives.

Q. Did he prefer the scheme on which you ultimately settled?

A. Yes, he did.

Q. Okay, what were the other six-year cropping patterns that you were considering?

A. Oh, I think the way it worked out was he thought it is, if my recollection serves me, he thought it was a good idea to put in something other than alfalfa and barley in the sixth year. And I think we talked primarily about, oh, I think he mentioned oats, wheat, corn, and I think he favored corn.

Q. Do you recall any particular reason why he favored corn?

A. I think it was because of the possibility of root diseases for the alfalfa, and I believe he felt that corn was a good crop to use to hedge against that possibility to eliminate diseases.

Q. How does that work, having corn in there?

A. I don't know.

Q. So you accepted his recommendation without really understanding the whole basis behind it?

A. No, I had discussions with a number of other people,

and there were others who agreed that corn was a good sixth year crop for rotation.

Q. Okay, who else did you speak with?

A. Well, I spoke with a number of farmers.

Q. Uh-huh.

A. That's all I can remember at this time.

Q. In your interviews, did you find that the crop rotation scheme that you were proposing here, or some similar variant of it, was actually used in practice in the area?

A. Oh, variations of it, uh-huh.

Q. Did the farmers with whom you spoke agree that corn is a good crop for avoiding the root diseases endemic to alfalfa?

A. I didn't go into that with the farmers.

Q. So for that aspect of your selection, you're relying on Mr. Hanks?

A. Uh-huh.

Q. Do you believe it reasonable in designing the crop rotation scheme of a future irrigation plan to rely on an agronomist to determine things, such as the selection of corn for a sixth year crop?

A. Yes, I think that's a reasonable thing to do.

Q. Okay. So, what did you do after you set up this rotation pattern?

A. I should clarify one thing: He did not select the crop, I did. If you said to rely on him to select it, I don't.

Q. Oh, okay.

A. I did not have him select it.

Q. He recommended corn; and, based on his recommendation, you selected it?

A. He recommended corn. And, based upon his recommendation and other considerations.

Q. Okay, what were the other considerations?

A. Okay, what were the other considerations? I just named them: Corn silage is fed to cattle.

Q. Okay. How did you get from the sixth year cropping rotation pattern that you set up to the particular percent distributions shown on Table 3?

A. Well, if you divide 100 percent approximately by 6, you come up with these percent distributions.

Q. Is the nurse malt barley 16 percent the first year seeded to alfalfa?

A. That's right, yes.

Q. Okay, then the next four years together comprise the 67 percent alfalfa?

A. That's right.

Q. And the sixth year would be composed of malting barley, corn silage and corn grain?

A. That's right.

Q. How did you decide on the composition of crops for Year 6?

A. Oh, malting barley is a good return crop, it has a good net return. It's desirable to raise some corn for silage. It's also desirable to raise some corn for grain, as I said before.

Q. Uh-huh.

A. To a great degree, the percents selected are somewhat arbitrary.

Q. Somewhat arbitrary?

A. It could have been a different mix in the sixth year.

Q. Is it your opinion that the method you used to choose the composition of the sixth year crop pattern was a reasonable method?

A. Yes, I think so.

Q. Okay. Is the percent distribution described on Table 3, Dornbusch Exhibit 6, the same distribution that you used for this table for other discount rates?

A. It is.

Q. So then, your distribution on Table 3 would be identical with those on Dornbusch Exhibits 16, 17 and 18?

A. Yes, it is.

Q. Okay, I asked that because they are not shown on some of those pages and I wanted to make sure.

A. Yes.

Q. I think it is on 16, but not on 17 and 18. Same pattern all the way through?

A. Same pattern.

Q. Okay, under the highland columns on Table 3, I presume that the 17 percent malting barley is the sixth year crop?

A. That's right.

Q. The 16 percent nurse malt barley is the first year?

A. That's right.

Q. And 67 percent alfalfa is Years 2 through 5?

A. That's right.

Q. Okay, I'm catching on.

How did you determine the weighted average net returns on Table 3?

A. I multiplied the proportion by the net return and summed the total.

Q. Okay, where do we go from the net returns?

A. Okay, the net returns shown in Table 3 are identical to the -- oh, excuse me, in Table 4, the first step is to calculate an average annual net return for each of the five project areas. This was done

by taking the proportion of each of the five project areas, which consist of highland and lowland areas, and from that proportion, determining their respective average annual net returns.

Q. Okay. And do you have a copy of those calculations with you?

A. No, the calculation is simply taking the weighted average net return from Table 3 --

Q. Uh-huh.

A. -- at the bottom and multiplying each by its respective proportion.

Q. Okay, where did you get the respective proportions for the five project areas of highland and lowland?

A. From Stetson Engineers,

Q. Okay, any specific person at Stetson?

A. Woldezion Mesghinna,

Q. Okay. Are the figures that Wold gave you reflected in the first three columns of Table 4?

A. Which are you calling the first column?

Q. Project area.

A. Yes, they are.

Q. When did Wold give you those numbers?

A. It was within the last two or three weeks, as I recall.

Q. Okay, did you have any discussions with him about

the criteria by which he was to divide the project areas into the lowland and the highland?

A. Yes, I told him that the break point was 5900 feet, and that's how he divided the lowland from the highland.

Q. Do you know how he determined the acreages of lowland and highland in each project?

A. I do not.

Q. Okay, we'll go to Wold for that one.

Okay, how did you compute the average net return, the next column over on Table 4?

A. I just explained that.

Q. Okay, that's weighting the percentages of each by net returns for lowland and highland from Table 3?

A. Right.

Q. Okay. Now, we get to the fun part: How did you determine the annual on-farm irrigation O and M costs?

MR. MERRILL: Off the record.

(Off-the-record discussion.

Q. (By Mr. Merrill) Do you have a copy of your O and M calculations with you?

A. I have. The O and M costs for hand move and side row sprinkler systems for each of the five project areas and also the percentage of each on each of the

five project areas.

Q. Okay, do the O and M costs vary by discount rate?

A. They do not.

Q. Did you assume one rate throughout all of them or does the discount rate not even play a part in it?

A. The discount rate was not used in determining the O and M costs.

Q. Okay, do you have a copy of your O amd M cost calculations with you?

A. I have a copy of -- Excuse me. Excuse me, the discount rate does play a part, but I will -- I think the best way to do it is to explain it as it comes up.

Q. All right.

A. And give you these tables. And there are some notes on the bottom, so if it's all right with you, I would like to make a copy of this and remove those notes.

MR. MERRILL: Sure. You bet.

(Brief pause.

(The instrument hereinafter (described was identified as (Dornbusch Deposition Exhibit (No. 19.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) Dave, I show you Dornbusch

Exhibit 19. Would you identify that for me?

A. Yes, it consists of three pages which show the numbers used to calculate the O and M costs for each of the five project areas.

Q. Okay, let's start with Page 1 and go through it.

A. Okay, each project area consists of some areas that will be served by side row sprinklers and some by hand moved. The first two rows show the percentages of each project area served by each of those types of sprinkler systems.

Q. Who made that determination?

A. Woldezion Mesghinna.

Q. Okay, so he just fed you percentages by area?

A. That's right.

Q. Okay. And the following two rows of numbers show the O and M costs per acre in 1979 normalized prices. Where did those come from?

A. Partially from Woldezion Mesghinna and we made some calculations based upon the figures he gave us. Specifically he gave us the repair and maintenance -- the operation, repair and maintenance costs and labor for each individual row -- for each of the side row and hand move systems.

Q. Uh-huh.

A. And we added the miscellaneous overhead costs, the

interest costs and the management costs to determine the totals. And those calculations are shown on Pages 2 and 3. The totals from those two pages then are shown on the first page, the third and fourth row of numbers. And taking the proportions of each according to the first two rows of numbers, we calculated the weighted average --

Q. Uh-huh.

A. -- operation and maintenance costs at the bottom of this first page.

Q. Okay. So the first page is sort of a summary of the whole works?

A. That's right.

Q. Okay, let's go to Page 2 of Exhibit 19, which my copy anyway says side row.

A. Yes, okay.

Q. What does the note mean that says "numbers in parentheses are fully costed"?

A. Oh, it's the same situation as we had before with the -- where we used the opportunity cost of labor, the numbers in parentheses should be about five times the numbers that are outside the parentheses showing the full cost of labor.

Q. Okay, who came up with the repair and maintenance numbers, was that you?

A. Woldezion Mesghinna.
Q. He just fed those to you?
A. That's right.
Q. Just as they are by project?
A. That's right.
Q. How about the numbers under labor to reset, did you determine those or did Wold?
A. No, Woldezion did, too.
Q. Okay, which numbers did he give you, the fully costed?
A. Yes.
Q. And you converted those based on the assumptions we described earlier about labor?
A. That's correct.
Q. Okay, subtotal 1 is simply the arithmetic sum of repair and maintenance and labor to reset?
A. That's right.
Q. Who determined miscellaneous overhead?
A. We did. The same basis as we did earlier at 5 percent of the subtotal, which was fully costed labor however.
Q. Is that the same way you did it back on the crop budgets?
A. Yes.
Q. Do you have your computations with you by which

you calculated the miscellaneous overhead costs?

A. There is no calculation other than what you see there.

Q. All I see is 49¢.

A. Well, yes, I mean, we let the calculator take care of the calculations.

Q. My accounting professor would clobber me, but why don't you show me how you figured miscellaneous overhead for the North Crowheart?

A. Sure. Forty-nine cents --

Q. Uh-huh.

A. -- is 5 percent of the number in parentheses, 9.70, 9.70 is the sum of 7.2 and 2.5 above it,

Q. How did you select 5 percent as a percentage figure to apply to Subtotal 1 to determine the miscellaneous overhead?

A. I believe it was the same basis that we used to determine overhead on the crop budgets.

Q. Well, on the crop budgets, and I'm looking at Dornbusch Exhibit 7 --

A. Yes.

Q. -- I see general miscellaneous.

A. That's the same one.

Q. Okay.

A. Yes, general miscellaneous is miscellaneous overhead.

Q. Okay. Well, I saw an overhead interest, so I started getting confused.

A. Yes, me, too.

Q. So on the cost budget, general miscellaneous is 5 percent of the fully costed subtotal of costs to that point?

A. Correct, uh-huh.

Q. Dave, on Dornbusch Exhibit 7, then you have a general miscellaneous expense of $4.00 for a total. That would be 5 percent of the $70.82?

A. No, $70.82 is not fully costed labor.

Q. Oh, I would have to take $2.30, multiply it times 5?

A. Yes.

Q. Add that to --

A. Right, you would have to add $70.82 to fully costed labor, which is about five times $2.30. I say "about" because there may be some differences due to rounding - subtract out the $2.30, multiply your result by 5 percent and you have $4.00.

Q. And you get four bucks?

A. That's right.

Q. Okay, thanks.

Okay, is that the way you determind miscellaneous overhead throughout all of your crop budgets?

A. It is.

Q. Okay. And is that the way you determined miscellaneous overhead for the side row and hand move irrigation systems?

A. It is.

Q. Okay, let's go to interest on cash.

A. Okay.

Q. Tell me how you get that one.

A. Okay, a similar principle is followed here. We charged interest on the outlay at the discount rate used. But assuming that the outlay was spread evenly over the period, we took only half of it to approximate the outlay at the midpoint.

Q. Three and 9/16 would be half of 7 1/8?

A. Seven and 1/8.

Q. Okay. So I take it that the interest on cash computations varied depending upon which discount rate you're operating under?

A. It would have except for the fact that the differences are so negligible that I didn't bother calculating it for each discount rate. I calculated it for North Crowheart for the three interest rates and saw that we were dealing with a difference of pennies and that the difference was not significant since I was going to be subtracting this number from

a number that was so much larger. So in all cases, I used the conservative, the higher number.

Q. The 7 1/8?

A. The higher cost, yes.

Q. Okay, why did you take half of the discount rate?

A. Because the cost is spread over a period, and the cost that you incurred yesterday obviously has quite a bit less cost in terms of discounting it to the present than the cost you incurred a year ago.

Q. Uh-huh.

A. If these costs are evenly distributed over the year or over the irrigation operations as we assume, a reasonable assumption as to -- or operating assumption for calculating is to assume that all of the costs came at one point in the middle and discount that figure --

Q. Okay.

A. -- because once again that interest cost is really a discounting.

Q. Okay, what numbers or figures is the discounting of, all of the previous costs above it?

A. Yes.

Q. So I would add the miscellaneous overhead to the Subtotal 1 --

A. Right.

Q. -- would that be fully costed?

A. Yes.

Q. So it would go half the discount rate times the fully costed Subtotal 1?

A. Plus overhead.

Q. Plus overhead?

A. Right.

Q. Okay, let's try one of those. Show me how it works. I get $10.18.

A. Uh-huh.

Q. Times 3 9/16 percent?

A. Well, I don't -- Yes, and that's .36, 36¢, and 36 times .2 -- Something's wrong there.

MS. SLEATER: David, are you getting tired?

THE WITNESS: Yeah, I'm afraid I'm not focusing too well on what I did.

MR. MERRILL: That's a hint from your lawyer. You're supposed to say, "I'm really pooped and I need a break here. Let's wait until the morning,"

MS. SLEATER: Thank you.

David --

(Off-the-record discussion.

(Recess, 5:10 p.m.

* * * * *

Tuesday, January 13, 1981

* * * * *

(Beginning at 8:15 a.m.

MR. MERRILL: Well, let's go ahead and go on the record.

Tony, are the Tribes going to call Peter Iverson as a witness?

MR. ROGERS: There are no present plans to do that.

MR. MERRILL: Okay, because if anybody is planning to call him, either the United States or the Tribes, we want to go ahead and take his deposition before the trial starts.

MS. SLEATER: We keep telling you we are not planning to call him, Jim.

MR. MERRILL: I just want to tell you if he shows up at trial, we will claim surprise and we are going to move for a continuance.

MS. SLEATER: You've got every three weeks between every two days of trial anyway.

MR. MERRILL: I understand. We just wanted to let you know if he shows up at trial, you're going to hear these very words read back to you.

MS. SLEATER: He may show up just out of natural curiosity.

MR. MERRILL: I assume to testify.

Can we cut a deal with the Tribes concerning deposing your witnesses, your five folks, or do we need to wait and see how far the trial progresses before your folks will finish their final conclusions?

MR. ROGERS: Well, in part, that's going to be true. I don't know, I thought you and Harry had talked about particularly Lansford and Cummings.

MR. MERRILL: I spoke with Harry a couple of weeks ago --

MS. SLEATER: They're still doing it.

MR. MERRILL: And he said everybody was still charging along and that they would not be able to reach their final opinions until they saw some parts, and he didn't say which, of the United States' case in chief at trial --

MR. ROGERS: Uh-huh.

MR. MERRILL: And I was wondering if that was the case or could we go ahead and notice up depositions for the week of February 2nd, that week in between the two weeks of trial, if some of us are going to be out on the West Coast anyway, and we could go to San Francisco if you're not willing to bring him out here and so forth.

MR. ROGERS: What, during that week?

MR. MERRILL: Yeah.

MS. SLEATER: They are not in San Francisco.

MR. MERRILL: Well, Todd and Lawler are.

MS. SLEATER: I thought --

MR. ROGERS: Even Lawler at this point is waiting on actually how this turns out here.

MR. MERRILL: Oh.

MR. ROGERS: The terms of how much we're going to use him and exactly what -- Todd, I suppose, is not -- he's not that -- he's not particularly waiting on anything.

MR. MERRILL: Would it be productive to do him on the 2nd? I would like to have the final conclusions. I don't want to have another one of these travesties like we had in July.

MR. ROGERS: No, I understand that. I don't know of any reason. I don't know that we need to go all the way to the West Coast for that.

MS. SLEATER: Go to the East Coast.

MR. MERRILL: Well, I was just wondering.

MS. SLEATER: I so enjoyed David's deposition last time.

MR. MERRILL: We better hope the transcript of that one never finds its way into court.

MS. SLEATER: It's never like deposing a person a little too soon or something.

MR. ROGERS: Well, he was caught a little early as it turned out.

MR. MERRILL: Should we go ahead and plan on doing Todd on the 2nd if he's essentially done? Maybe we should do it and hold off on Lawler and the other folks, Cummings and Lansford, until later on down the road.

MR. ROGERS: Yeah. I don't really know how long they are going to take, whether they will be ready themselves or not, but I doubt it.

MS. SLEATER: I doubt it, too.

MR. MERRILL: Come on, Regina, they are not even your witnesses.

MS. SLEATER: No, but I know what they've been waiting for and so forth because I've been talking to Harry. Harry tells me things, he's not like Tony.

MR. ROGERS: The thing is it will be more efficient if we could do it, at least for travel, if we could do them all at one time. The 2nd of -- So you're counting on we're not having trial the second week after we start? In other words, because that's the second --

MR. MERRILL: Yeah, Sandy has another setting the week of February 2nd,

MR. ROGERS: Then a week of trial on the 9th

and nothing for another month after that, if Teno buys that schedule?

MR. MERRILL: Yeah. So maybe after the 9th.

MR. ROGERS: Because I don't --

MS. SLEATER: That would certainly leave a big block of time.

MR. MERRILL: Let's think about doing it sometime after the week of the 9th; then maybe they'll all be done.

MR. ROGERS: I think that might be better.

MR. MERRILL: Okay, we can talk about it later on.

Regina, here is a copy of the letter that Jeff Fassett wrote to Duane Woodward on December 15th. An expeditious reply would certainly be appreciated by all.

Also, we asked your folks at HKM to give us reproducible stuff on the 1969 aerials. All those are on the way, I hope.

MS. SLEATER: Craig talked to Ross about it and that was --

MR. SOMMERS: I just wanted to make sure, because if you could follow it up with a phone call --

MR. MERRILL: That would sure help us out.

MS. SLEATER: I'm sure Ross was sending it

over.

MR. SOMMERS: Okay.

MR. MERRILL: Jeff left that copy so that you could have it.

MS. SLEATER: Were we on the record all this time?

THE REPORTER: Yes.

MS. SLEATER: Oh. Okay.

MR. MERRILL: Ready?

THE WITNESS: I am ready.

EXAMINATION (RESUMED)

BY MR. MERRILL:

Q. Okay, the first task of the morning is to define economic feasibility as it applies to what you're doing here.

A. Okay, I'm using it in the sense that if the benefits of a particular project exceed the costs for that project, the project is considered feasible.

Q. How about if benefits are exactly equal to costs?

A. It is also feasible.

Q. So if the benefits are greater than or equal to costs, it is feasible?

A. Right, uh-huh.

Q. How broad is the universe in which you look at costs and benefits, are we talking about direct

costs and benefits or do we go to these four accounts that are often used in the WRC guidelines? In other words, how broad or how narrow is the inquiry to costs and benefits?

A. How broad is it in the abstract or how broad is it in this particular case?

Q. In what you're doing in this case.

A. Well, all I can say is the way I have determined -- excuse me, all I can say is the costs and benefits that I have selected that are appropriate for this particular analysis, and those are the costs and benefits which I have presented to you yesterday.

Q. And will present this morning?

A. Correct.

Q. We have a few more to go, right?

A. Right.

Q. So it is your opinion that if the benefits of the project we've been talking about, or be it five projects, however you want to look at it, exceed or equal the costs, then it is your professional opinion that the project or projects are economically feasible?

A. Would you restate what you just said, please?

Q. Sure. Maybe I can clear it up a second time around.

Is it your professional opinion that if the

project benefits equal or exceed the project costs, that the project is economically feasible?

A. Yes, it is.

Q. And what's the basis of that opinion?

A. My professional judgment.

Q. Have you done or do you contemplate doing any economic analysis with respect to new lands to be irrigated in the FIP's?

A. I have no plans to do an analysis of benefits and costs on new lands to be irrigated within the FIP's.

Q. Okay, how about lands within areas that can be served under state issued permits?

A. Well, maybe I can explain it easier if I just say I have no plans to perform analyses of benefits and costs similar to the way I have presented today and tomorrow -- yesterday and today, excuse me.

Q. You may be right.

A. -- for any project areas other than the project areas that I have presented to you.

Q. Okay. Now, you used the word "analysis similar to these project areas". Are you doing any economic analysis with respect to lands now irrigated or proposed to be irrigated within the FIP's?

A. We have been asked to provide some information to

the economic benefits for irrigating some lands other than these project areas, but I can't identify those lands. I don't know where they are.

Q. Okay, what information have you supplied?

A. The only information we have supplied has been with respect to the returns that might be expected on reclaimed lands.

Q. To whom have you supplied that information?

A. To Stetson Engineers.

Q. And in what form did you supply it?

A. It was just verbal information transferred over the telephone.

Q. Okay, what did you tell them?

A. I told them that the yields might be comparable to the yields that we have already shown for the five project areas for those crops that we analyzed.

Q. Was there a phone conversation with Wold?

A. As I recall, it was a phone conversation with Wold, but it might have been someone else at Stetson's office. I can't recall now.

Q. Did you supply them with any information concerning crops other than those proposed for the five new project areas?

A. I don't think so.

Q. Did you supply them with any other information?

A. Like what? What do you mean?

Q. Cost information about reclaiming lands within the FIP's, any other type of information.

A. Oh, yes. Yes, let's see. We also informed them that the acids that have been applied to reclaim lands in that region have cost the farmers considerably less than $100 per acre.

Q. What acids have been used to reclaim lands?

A. Sulfuric acid, as I recall.

Q. Okay, so you told somebody at Stetson Engineers that the acids used to reclaim lands within the FIP's cost less than $100 per acre?

A. That's right.

Q. Is that a normalized cost?

A. It was not a normalized cost.

Q. Not a normalized cost? That must be a first. What was the basis of that?

MS. SLEATER: Just a second.

(Off-the-record discussion.

A. Okay, the way you restated my statement, you specifically referred to farmers in the FIP's, and I can't recall if all of the farmers to whom I referred were in the FIP's.

Q. Okay, where would they be if not within the FIP's, the farmers that you spoke about?

A. I can't recall. I just can't specifically state that the farmers who I spoke with were in the FIP's.

Q. Okay. Well, just so we've got a clear record on it, why don't you restate what it was you told Stetson about the cost of acid used to reclaim these lands, whatever they are.

A. I think the way I stated it was clear.

Q. Which was?

A. You can read it back from the record, if you wish.

Q. Well, I would like to have you just lay it out in one sentence because you didn't like the way I said it.

A. Oh, the only thing that I was objecting was stating that I had said they were in the FIP's. I did not state that they were in the FIP lands.

Q. So you told somebody at Stetson that the cost of acid to reclaim lands in the region --

A. Right.

Q. -- was less than $100 per acre?

A. Right.

Q. A cost that was not normalized?

A. That's right.

Q. Okay. Now, how did you get that information?

A. I interviewed some farmers who had reclaimed land.

Q. Did these farmers tell you where they were getting

their acid?

A. I don't recall exactly. I believe one farmer did tell me.

Q. Where did he tell you he got it?

A. I think he said he purchased it from a refinery.

Q. Is this the same series of interviews that we discussed yesterday concerning which you have already given us your notes?

A. Let me see.

No, these are different interviews.

Q. Okay, do you have your notes of those interviews with you?

A. Yes, I have.

Q. Do you want to check with your lawyer and see if you can give us copies?

(Brief pause.

A. All right, I would be happy to do that with the same restriction as yesterday that I remove the names and other identifications.

Q. Okay, does that mean that you want to do the Xeroxing?

A. That's what it means.

MR. MERRILL: Okay.

MS. SLEATER: He seems overjoyed at the prospect.

THE WITNESS: Do you want to do that now, or should we do that during a break?

MR. MERRILL: Why don't we do it during a break and come back to it.

THE WITNESS: Okay.

Q. (By Mr. Merrill) Dave, do you recall what the $100 per acre cost of acid included, was that just for the acid or did it include application?

A. I think it included application as well.

Q. Okay. So that was the total cost of getting the acid into the ground?

A. Yes.

Q. How much acid would that take per acre?

A. The amount of acid applied by the farmers that I interviewed somewhat. Generally, it was in the range of about 2 to 3 tons per acre; in some cases it would be higher where there were critical spots that needed to be reclaimed.

Q. Okay, what kind of prices per ton were the folks you interviewed talking about?

A. Well, again, the prices varied somewhat depending upon the quantities that were being applied and the sources of supply; as I understand, the cost to those farmers was even less than $50 an acre to apply it.

Q. Can you give me a range of price per ton that the farmers paid?

A. I think it was in the range of $10 to -- it was more than $10. It was maybe as low as $10 per ton and not over $50.

Q. Not over $50, 5-0?

A. Fifty dollars per ton.

Q. Okay, did any of the farmers you interviewed about the acid give you a breakdown on this $100 per acre of labor vs. material costs?

A. No.

Q. Okay, did you provide any other information about these lands besides your opinion that the yield would be comparable to the five new project areas and that some folks were using acids, sulfuric acid to reclaim lands at a cost of less than or about $100 per acre?

A. I think I misstated something when I was talking about the cost of acid.

Q. Uh-huh.

A. I was talking in terms of per ton; in fact, I meant per acre.

Q. Which costs were those, that's the $50?

A. Yes.

Q. Oh, did any of the farmers quite you a raw price

of acid per ton?

A. No.

Q. So you discussed with them costs only in terms of how much to get an acre back into shape?

A. That's right.

Q. Okay, how many farms did you talk to about using acid to reclaim lands?

A. Two farmers.

Q. Okay, did you base your opinion about the costs of reclaiming this land with acid on anything other than the interviews with two farmers?

A. No.

Q. Okay, were these interviews by telephone or in person?

A. I beg your pardon, would you restate your question before?

Q. Did you base your opinion that lands could be reclaimed using sulfuric acid at a cost of less than or equal to $100 per acre on anything other than your interviews with two farmers?

A. No.

Q. Okay, is the opinion we've been talking about that you can reclaim lands at $100 per acre or less using sulfuric acid, does that rise to the level of a professional opinion of yours?

A. I was relaying information that had been obtained in some telephone interviews to Stetson Engineers, I was not making my own evaluation of this beyond relaying that information and saying -- and explaining that these farmers seemed to be representative farmers of the area and their information seemed to be valid.

Q. Okay, so the $100 per acre doesn't reflect your professional judgment; you were serving merely as a conduit for information?

A. Yes, that's right.

Q. Okay, how did you determine that the two farmers that you interviewed by telephone -- Were these by telephone?

A. Yes, that's right.

Q. How did you determine that the two farmers that you interviewed by telephone were representative farmers of the area or the region?

A. I can't recall exactly now, but, as I remember, I was referred to them by the chief soils scientist of the Riverton project.

Q. Who is that?

A. George Schoenfeld.

Q. Can you spell his last name?

A. S-c-h-o-e-n-f-e-l-d.

Q. Okay, George referred you to these two folks and said these are typical farmers in our area?
A. He referred to me at least one, and it is possible the one he referred me to referred me to the second one, but I can't recall if he referred me to both or just the first.
Q. Okay, did he give you some indication that the person or people he was referring you to were representative farmers in the region?
A. Yes, I believe that's right.
Q. Okay, do you think it is reasonable to rely on the word of somebody like George Schoenfeld that a farmer you're about to contact is a representative farmer?
A. Yes, I think that is reasonable.
Q. Okay, I've got essentially two items you talked about concerning FIP's and perhaps other lands; one that the returns on reclaimed lands were essentially comparable to the five project areas?
A. No, I didn't say that. I said the yields.
Q. The yields, okay. That the yields were comparable to the five project areas, that's o ne of them; and second, that some of these lands could be reclaimed using sulfuric acid at a total cost of $100 per acre or less, not normalized?

A. I said less than $100 per acre.
Q. Okay, less than $100. Did you transmit or supply any other information concerning FIP's or land under permit?
A. I did not. I assume you mean with respect to what we've just been talking about?
Q. Well, maybe I've got my notes wrong, but I had something down about your saying something earlier about supply information concerning returns on unclaimed land -- on reclaimed land, excuse me, but that was only yield information.
A. If I said "returns", I misspoke.
Q. Okay.
A. I did not calculate returns, as I explained earlier.
Q. Are you aware of any economic analysis or economic information concerning costs and returns of reclaiming lands within the FIP's or on lands under permit?
A. Am I aware of information that exists?
Q. Yeah, that's been generated for this case.
A. No.
Q. All right, let me try this one more time and see if I can get it right. All of your economic analysis and work has been devoted to the five new project areas with the exception of two things: First, you told somebody at Stetson that yields on reclaimed

lands around the FIP's would be comparable to the five new project areas and you told somebody at Stetson that you could use sulfuric acid to reclaim lands in the area at a non-normalized cost of less than $100 per acre?

A. I believe that's correct.

Q. Okay. And with those two exceptions, all of the other work you have done has been related to the five new project areas, is that right?

A. Well, I'm concerned about the categorical statement that all of the other work that I have done is related to the five project areas.

Q. Well, go ahead and modify it any way you see fit.

A. I just want to be careful to make it clear that the work I have done may have addressed conditions that occur outside of the project areas, but I think for your purposes what you're interested in is the fact that the work that I have done has had the purpose of developing an analysis in those five project areas.

Q. Well, my purpose is to be interested in just about everything you have done.

A. Well, let me state it this way: The analyses I have done are related to those five project areas.

Q. Okay, do you know if the economic analysis that you

have done on the new areas has been applied or will be applied --

A. I do not know.

Q. -- to the FIP's or lands under permit?

A. I don't know what they are doing with that information.

Q. Do you know who would be doing anything with it?

A. I do not.

Q. Is it fair to say that, as far as you know, nobody is doing an economic analysis of reclaiming FIP lands?

A. No, that's not fair to say.

Q. Well, tell me what you know about it.

A. I do not know what's being done.

Q. Well, I said as far as you know; I'm not trying to argue with you, I'm just trying to find out if you do know if anybody is doing an analysis, an economic analysis --

MR. ROGERS: Why don't you restate the question so -- have the reporter read it back so he knows.

Q. (By Mr. Merrill) I'm restating the question right now: To the best of your knowledge, is anyone doing an economic analysis of reclaiming irrigated lands within the FIP's?

A. I do not know specifically if or who -- if someone

is doing an economic analysis of the costs and benefits of reclaiming lands within the FIP's

Q. Okay. Have you developed crop budgets in addition to the ones you have shown us yesterday?

A. I have not.

Q. Okay, would the crop budgets that you developed for the new project areas be applicable to an economic analysis of reclaiming land within the FIP's?

A. I can't make that judgment without looking at the conditions on the FIP lands.

Q. Do you believe that the overall economic analysis that you have done concerning the five new project areas is applicable in any way to the lands to be reclaimed within the FIP's?

A. Oh, I think it is probably applicable in some way.

Q. How would it be applicable?

A. I don't know, I haven't looked at the FIP lands.

Q. Are you saying then that some economic analysis should be done or that this one could be used?

A. No, I'm saying neither of those things.

Q. Okay, what are you saying?

A. Nothing more than I have said.

MS. SLEATER: Jim, can we have a break for a second?

MR. MERRILL: Sure. Why don't you go ahead and Xerox your notes.

(Recess, 8:55 a.m. to 9:10 a.m.

MR. MERRILL: Okay, let's go back on the record.

Q (By Mr. Merrill) Dave, during the break you Xeroxed for us copies of the notes we were talking about earlier, and those are marked as Deposition Exhibit 20. Would you identify that for the record, please?

A. These are my notes from tlephone conversations I had with two farmers concerning their application of acid to reclaim land.

THE WITNESS: Do you have a copy?

MS. SLEATER: No.

Thank you.

Q. (By Mr. Merrill) Some of these crops are marginally legible. Is this your handwriting?

A. It is.

Q. Can you rather quickly just run through the phrases that are marked down, paraphrase your way through the notes real quickly in case we have trouble deciphering them later?

A. Okay, at the top it says "Reclaimed Land - Interviews". Over at the right it indicates telephone by myself.

Q. Is there a date in the upper right-hand corner?

A. There was a date.
Q. Mine just says "80".
A. That's right.
Q. Do you recall about when these were written?
A. It was around November.
Q. Okay.
A. I shall read every word on it, then there's no --
Q. Well, a lot of it is fairly cryptic to me, at least anyway, so if you could slip through it fairly quick, I would appreciate it.
A. Okay, I took out the number of acres, but you see the word "acres, now alfalfa - stand of hay, 4.5 - 5.0 tons expected for '81."
Q. Uh-huh.
A. "Underground tile drains - spring '77 or fall '76."
Q. Is that when they were put in?
A. Yes.
Q. Okay.
A. "Two tons of sulfuric acid per acre only - no other amendments up to 6 tons per acre in the fall of '77. Plowed for 3 years. '78 oats, not a good yield. '79 and '80, 50 bushels of barley malt --" I'm sorry, the 50 bushels applies to '79, the 72 bushels to '80 over 20 acres sold to Coors. Nurse crop for alfalfa.
Q. Were the '79 and '80 crops malt barley?

A. Both malt barley, both nursing alfalfa.

Q. All right.

A. "Ph was over 8, now it is 7.4 - 7.6."

Q. Uh-huh.

A. "Thirty-five to 40 bushels is the yield for the oats in '78."

Q. Okay.

A. "Less than 2 acres won't take seed. Sandy loam - same as rest." Then the rest of the notes refer to the second telephone conversation in which that farmer reclaimed hay fields which were very sour alkali soil. Therefore, no alkali fertilization.

Q. Uh-huh.

A. The indication of the amount of P-205 applied, applied 250 tons of phosphoric acid this year to lower the pH. He felt it was better than sulfuric acid, which he applied 3,000 tons of sulfuric acid last year. He applied 2 to 3 tons per acre up to 20 tons in critical spots, and he was telling me that the irrigation water has a pH of 8. Soils have a pH of 7.2 to 7.6.

Q. Uh-huh.

A. To clarify that 20 tons in critical spots, he did say those were -- well, it is clear, I think from what my notes say.

Q. Well, it doesn't say anything on my notes other than 20 tons that he --

A. That he applied 20 tons in critical spots, right.

Q. Did he mention to you anything about how many critical spots there were?

A. There were very few and very small, as I recall.

Q. Okay.

A. He's applied -- he's made applications as much as twelve years in a row. He told me that the sulfuric acid replaces phosphates in the soil. The crops he grew were straight hay, meaning alfalfa hay, and his yields were 4.0 tons on two cuttings. Even in the first year, no big deal. He did not always nurse it with barley. That says "total farm" and I took out the number of acres. "Without nurse barley, he gets 2.5 tons of alfalfa in the first year. Can't spray barley to get rid of weeds, but will plant barley this year. New barley needs cover crop because it is a steep field. Twenty-five ton loads of acid is the quantity in which he has purchased it. He said that it is black in color because it is a wash-out from lines in refineries. He gets some residues, but that's okay. He gets trace elements, some lead, but not much. Oil settles to the bottom, so he doesn't drain the tank to the

bottom."

Q. Uh-huh.

A. "Does this on all ground as a matter of practice. Better stands on new seeding because of acid treatment. Six tons on some acres - exceptional, but happens. High quality alfalfa."

Q. Are there any matters which were related to you during these two interviews on which you relied in discussing the $100 per acre reclamation costs which don't show up in Dornbusch Exhibit 20?

A. Yes, evidently I didn't put that down in my notes, but I do recall that the second farmer in particular did talk about his costs and he indicated that it was less than $10 an acre.

Q. That would be for putting this acid from the refinery on his land?

A. That's correct.

Q. Did he tell you if that was just the cost of the acid itself or did it include hauling it and spreading it, or did he say?

A. He didn't say.

Q. Is the $100 per acre reclamation cost an annual cost or a total cost over all time?

A. I believe it is an annual cost -- excuse me, I believe it is the cost that's required to reclaim

the land and can be incurred entirely the first year to reclaim the land.

Q. Are you saying then that you might spend that whole $100 per acre or less than that amount the first year and then not spend any more at all?

A. Yes.

Q. On what do you base that?

A. From the conversations with these farmers.

Q. Okay, are there any other significant facts on which you relied arising out of these interviews that are not reflected on Dornbusch Exhibit 20?

A. Not that I recall, no.

Q. Okay. In yourprofessional opinion, should an economic analysis be done concerning irrigation of lands within the FIP's?

A. I have no opinion on that.

Q. Do you expect to develop one before trial?

A. I don't know, I haven't thought about it.

Q. Okay, in your opinion, should an economic analysis be done concerning lands which have never been irrigated but may be served by permits before bringing those lands into production?

A. I don't have an opinion as to whether an economic analysis should or should not be done.

Q. Do you know if any economic analysis has been done

concerning lands, additional lands to be irrigated under permits?

A. I do not.

Q. Okay, yesterday in going through the gross returns for the five new project areas, we were discussing prices, and I forgot to ask you then if those crop prices were F.O.B. the field or the elevator or a train or how far down the road do those prices get you?

A. The prices are the prices paid at the point of delivery.

Q. And what's the point of delivery typically?

A. It varies with the products. The products which require some movement for delivery include the cost of that movement in the budgets.

Q. Okay, can you go through the five crops that you have proposed for the new project areas and tell us the point at which each price is applicable?

A. The corn grain and barley --

Q. Uh-huh.

A. -- are sold in Riverton and the production costs include the cost of transporting those products to Riverton.

Q. Okay. And that would be the price at sale in Riverton?

A. It's the normalized price.
Q. Okay.
A. As I said yesterday.
Q. That's right, normalized price at Riverton for malt barley, nurse barley?
A. For malt barley, that's right.
Q. Okay.
A. And for corn grain it's the again the normalized price.
Q. In Riverton?
A. Well, it's the normalized price that applies, I believe, to Wyoming.
Q. Do you know where that price applies in the chain, if you will, of getting the crop to its consumer for corn grain?
A. I think you can assume that that's the price that's applicable at a point of sale, such as Riverton.
Q. Okay, how about for alfalfa?
A. I believe that the price we used for alfalfa does not include the prices -- the price paid at the point of growing the alfalfa.
Q. So you would pay that price and then go in the field and pick up the bales yourself?
A. No, at delivery of the bales on the farm.

Q. Oh, okay.
A. To the buyer.
Q. So that would be F.O.B. farm?
A. Right.
Q. Okay, how about corn silage?
A. Corn silage is fed to cattle only on the reservation, it is not moved very far.
Q. Okay, would this be the price in place where it is grown or delivered to where the cattle are?
A. Where the cattle consume it.
Q. Okay, Dave, do you have your copy of Dornbusch Exhibit 9 there that you could pull out?
A. What is Dornbusch Exhibit 9 again?
Q. It is crop budget at 4 percent.
A. Yes, I have it.
Q. Okay, turn to Page 2. I noticed under the harvest operation - combine, somebody originally typed in 83 bushels and that was lined out and changed to 100?
A. Yes.
Q. Did you at one time run your crop budgets assuming 83 bushels per acre?
A. I think the reason that that was in there was that they were copying that directly from Agee's, and I think that the person who had computed what Agee

had used has copied down the 83 directly.

Q. Do you know if a crop budget was computed using 83?

A. Yes, I think a crop budget was computed using 83.

Q. Do you know if the benefit-cost ratio was computed assuming 83 as a yield?

A. It was not.

Q. Do you know why not?

A. Because before he got that far, I made the judgment that 83 was not the appropriate yield.

Q. Okay. So you changed your yield assumptions before you got as far down the road as starting to compute your benefit-cost curves?

A. Yes.

Q. Okay, do you have the crop budget at these lower yields, at 83?

A. No.

Q. Where are they?

A. I don't know if I have them any more. I don't know if they were even completed. I think they were, but I'm not real sure.

Q. Okay, do you want to check with your counsel and see, if you still have them, whether you can supply copies to us?

A. I'm sure I don't have them.

MS. SLEATER: That certainly eliminates me from the decision.

MR. MERRILL: Do you feel cut out of the action?

MS. SLEATER: Yeah.

Q (By Mr. Merrill) Would the same comments you made about the yield assumptions hold true for the third page of Dornbusch Exhibit 9 where 73 bushels is lined out and replaced with 88?

A. Yes, that's right.

Q. Okay, Dave, would you please pull out your copy of Dornbusch Exhibit 19? This is where I think we were yesterday.

A. Okay.

Q. When Regina indicated that you were looking a little tired,

A. Ha-ha.

Q. And I would hand you my calculator again.

THE WITNESS: Actually, I brought my own today.

MR. MERRILL: Oh, did you?

THE WITNESS: Yes.

Q (By Mr. Merrill) Okay. Well, I'll try to follow you along then.

MS. SLEATER: Mine is more modern than yours.

THE WITNESS: It doesn't do as many things though.

Q. (By Mr. Merrill) Ready to go?

A. Yes.

Q. Okay, do you recall exactly where we were? I think we were putting together interest on cash, as I recall, and we tried to work through that and it just wasn't fitting together due to the lateness of the hour.

A. Well, the way that this table is calculated --

Q. Uh-huh.

A. -- is -- now, I'm talking about interest on cash.

Q. Right.

A. Once you get down to Subtotal 1 and then calculate miscellaneous overhead --

Q. Uh-huh.

A. -- the interest on cash is an effort to calculate a figure for moving the value in time. And the way it is done is simply adding Subtotal 1 and miscellaneous overhead and then multiplying the sum of that by half of the interest rate, which in this case is 3 9/16.

Q. So for the North Crowheart would we use the fully costed Subtotal 1?

A. No, you use the Subtotal 1 as it is shown without

parentheses.

Q. Okay, so we add $3.94 to 49¢?

A. That's right.

Q. And then what?

A. Multiply by 3 9/16 percent.

Q. I get 15 7/8 pennies, and that would be rounded up to 16¢?

A. That's right.

Q. Okay, and you add that figure, the 16¢, to the not fully costed Subtotal 1 and the miscellanecous overhead to get Subtotal 2?

A. Correct.

Q. Okay. So Sub 2 equaled Sub 1 plus miscellaneous overhead plus interest on cash, is that correct?

A. Correct.

Q. Okay. And I notice you did fully costed subtotal in Subtotal 2. Why is that?

A. I did because the management is calculated on the basis of the cost, not recognizing the opportunity cost.

Q. Okay.

A. The cash cost.

Q. Why don't you go ahead and describe the management calculations then?

A. Okay, if you take the figure in parentheses in

Subtotal 1, $9.70 --

Q. Uh-huh.

A. -- add to it miscellaneous overhead of 49¢ --

Q. Uh-huh.

A. -- add to that the figure in parentheses of 36¢ in interest on cash --

Q. Uh-huh.

A. -- you get a subtotal 2 of $10.55. And that is the number upon which the management calculation is based, and the way you determine the management cost is to multiply the $10.55 by 10 percent, which is the financial cost of management, and that number again by 20 percent to determine the opportunity cost for management.

Q. Okay, let me try to recap and see if I have got it right. You take the fully costed Subtotal 1 --

A. Yes.

Q. -- which would be $9.70?

A. Uh-huh.

Q. Add into it the miscellaneous overhead of 49¢, add to that 36¢ for fully costed interest on cash, that should give you Subtotal 2?

A. Uh-huh.

Q. Of $10.55?

A. Yes.

Q. Take 10 percent of that as your standard management fee computation and then take 20 percent of that product as the actual opportunity cost of management, and that gives you your management fee?

A. That's right.

Q. Okay, let me try it.

A. That gives you your management cost.

Q. Management cost, okay.

(Brief pause.

MR. MERRILL: Eureka!

Q. (By Mr. Merrill) I take it you add the management cost to Subtotal 2 in the not fully costed version and come up with a total cost?

A. The opportunity cost version.

Q. Opportunity cost version?

A. It is fully costed.

Q. Oh.

A. The terms that I was using, fully costed and not fully costed, are not really exactly proper. It was easy to term them that way, but the costs that I'm showing are the proper fully costed opportunity costs, and that holds whenever I use the term "fully costed" or "not fully costed". My shorthand might not be --

Q. So one is the fully costed, those are the big numbers, and the other is the opportunity cost?

A. With the understanding I just explained.

Q. Okay, thanks for straightening me out.

A. You're welcome.

Q. How do you define a side-roll on-farm irrigation system?

A. I do not. You better ask Woldezion.

Q. Is there any labor cost involved other than the labor to reset in the opportunity cost for side-roll irrigation systems?

A. Well, management is a labor cost.

Q. Do you have any accounting in the O and M for side-roll of labor wages?

A. Do I have an accounting? There are labor wages paid to the labor. The repair and maintenance probably included labor, but I think the best thing for you to do to determine how much labor and where the labor is is to ask Woldezion. He was the one that developed the costs for the operations.

Q. Do you have listed anywhere in here a labor cost for repairs to the irrigation system?

A. I do not.

Q. Do you know if Wold included an item for repairs

in his costs?

A. A labor cost for repairs?

Q. Uh-huh.

A. I believe he did, yes.

Q. Then, in your professional opinion, would it be appropriate to include a labor cost for repairs?

A. I believe it is included in this table in repairs and maintenance.

Q. Okay. You probably told me yesterday, but I have forgotten. That figure came directly from Wold, the repair and maintenance?

A. That's right.

Q. Okay, so we should go to Wold to get the breakdown of the components of the repair and maintenance?

A. Yes. I can't recall exactly whether he gave us the labor hours and we determined the costs or if he determined the costs directly himself. It might have been one or the other.

Q. If he gave you labor hours, what factors would you use to convert that to labor costs?

A. We used $3,50 an hour for fully costed labor before determining the opportunity cost.

Q. Is that for skilled or unskilled labor?

A. I can't recall. I believe we discussed the skill required with Wold and applied the appropriate rate.

I believe it's -- and that rate is $3.50 an hour.

Q. Well, what is the skill required? Can an unskilled worker do this or are we talking about skilled?

A. The skill required to perform the repair and maintenance -- excuse me, that's for the application of the -- the movement of the sprinklers.

Q. Okay, would you consider that to be skilled or unskilled labor?

A. That's unskilled labor.

Q. How did you arrive at the $3.50 per hour figure for fully costed unskilled labor?

A. I believe that's the same rate that Agee uses and I think that's our source. I'll have to check my notes, it's been so long since I --

Q. Okay, why don't you go ahead and check your notes?

A. Well, I couldn't check it right now. I'll come back to you on that.

Q. Okay.

A. It's been so long since I developed that that I can't recall.

Q. So you will check your notes for the basis of that figure and let us know?

A. Yes.

Q. Thank you.

Did you use the same $3.50 per hour unskilled

labor charge in your crop budgets?

A. Yes, I believe I did.

Q. Okay, are there any differences on Dornbusch Exhibit 19 between the calculations on Page 2 for side-roll and paying $3.00 for hand-move in the figures or how they are treated?

A. Well, the figures are obviously different; the method of calculation is the same.

Q. Okay, for hand-move you got your repair and maintenance charges directly from Wold?

A. Yes, I believe so.

Q. But again, those could have been in hours or dollars?

A. Yes, I believe they were in dollars, but I'll have to check.

Q. Okay, can you make a note to let us know on that one, too, please?

(Brief pause.

MR. MERRILL: After hints from your counsel, do you want to change any of your answers?

THE WITNESS: No.

Q. (By Mr. Merrill) Did Wold give you the labor requirements for the various types of sprinkler systems or did you develop those yourself?

A. The amount of labor required?

Q. Uh-huh.
A. No, that came from Wold.
Q. For labor to reset each system?
A. That's from Wold.
Q. Okay, is that another instance where he might have given you dollars or hours?
A. I believe in the requirements to reset that he gave us the hours.
Q. Did you also use $3.50 an hour?
A. Yes.
Q. In converting those?
A. Yes.
Q. Do you have the hourly figures that Wold gave you for resetting side-roll and hand-move?
A. Let me see. For side-roll, I have a half hour for 1.82 acres per application and for hand-move I have .6 hours per acre per application.
Q. And where did you get those numbers?
A. From Wold.
Q. Okay, did you use $3.50 an hour for fully costed unskilled labor throughout your analysis?
A. I believe I did.
Q. Okay, where would be the break point between this unskilled labor and management?
A. As it is shown in those tables in the crop budgets,

labor is at the $3.50 rate per hour.

Q. Okay. What I'm wondering is with respect to all of the various operations that have to be done in the field, I presume that the guy who actually picks up the sprinkler chunks and moves them around is getting paid $3.50 an hour?

A. Right.

Q. Okay, how about the guy who supervises and says it is time to move that sprinkler?

A. I didn't estimate what that man is paid.

Q. How far up the managerial hierarchy do you go before you start placing the costs for personnel in the management column as opposed to the other labor charges?

I'm trying to get some sense of where the break point is. Maybe I'm not asking it the right way.

A. I believe the people that make the judgments about the irrigation practices are the managers and the people who carry out the directions of the management are the labor to reset.

Q. Okay, is there any intermediate level between the guy deciding to move an irrigation system and someone else actually doing the work, or is it a fairly clean-cut analysis?

A. I believe you would have to ask Wold about that.

MR. ROGERS: Would you read that question and answer back to me, please?

(The above question and answer
(were read back by the reporter
(as follows: "Q: Okay, is
(there any intermediate level
(between the guy deciding to
(move an irrigation system and
(someone else actually doing
(the work, or is it a fairly
(clean-cut analysis? A: I
(believe you would have to ask
(Wold about that."

Q. (By Mr. Merrill) Okay, do you have included in the costs of these sprinkler systems anywhere a charge for energy?

A. Yes, the charge for energy is in the irrigation costs that I assume we'll get to later.

Q. I'm falling apart at the seams here. Let me go back to Dornbusch 6 for a moment.

Dave, we've got different notes on this side of the table for our hourly requirements that you got from Wold for resetting the side-rolls and the hand-moves. You have a half hour per 1.82 applications for side-rolls?

A. Yes.

Q. And for hand-moves, what was the figure?

A. .6.

Q. .6?

A. Hours.
Q. Hours per acre per application?
A. Yes.
Q. Okay, thanks.

Did you perform or calculate any O and M costs for any types of irrigation systems other than side-roll and hand-move?

A. No.
Q. Nothing for center pivots?
A. No.
Q. Did you make any calculations for gravity irrigation?
A. No.
Q. No calculations for solid set sprinklers?
A. Just side-roll and hand-move.
Q. Okay, what's the next step after we have the charges for the irrigation system, O and M costs, where do we go from there?
A. The charges for O and M costs are subtracted from average annual net return in Table 4 of Dornbusch Exhibit 6 to give you the project area net benefit per acre,
Q. Okay.
A. The annual net benefit.
Q. Is Dornbusch Exhibit 19 the only computations you

performed of the irrigation system O & M costs?

A. They are.

Q. Okay, how do you get from the two totals for hand-move and side-roll to the annual on-farm irrigation O & M costs on Table 4 of Dornbusch 6? The figures don't agree.

A. The figures do agree.

Q. Oh, do they?

A. If you look at the first page on the table, the figures for the side-roll and hand-move are entered in the third and fourth row of numbers.

Q. Oh, and those are weighted by the kind of sprinkler system you're going to use on the project?

A. That's right, that's right.

Q. By golly, it is filtering through. Give me a little time. So you subtract annual on-farm irrigation O & M costs from annual average net return?

A. That's right.

Q. And that gives us the project area net benefit per acre on an annual basis?

A. Correct.

Q. Okay, how do you take that figure and convert it to a present value?

A. By multiplying by the factor which converts the annual return for a 100-year period to the net

present value for the appropriate discount rate.

Q. Well, okay, Dornbusch Exhibit 6 is a 7 1/8 discount rate?

A. I believe so.

Q. Okay, what would the factor be for 7 1/8?

A. I believe it is 14.52, but I don't have my notes in front of me.

Q. Well, while you're looking there, why don't you get the notes for the four discount rates you used and we'll just jot them all down here.

A. All right, it's 14.52 for 7 1/8 percent.

Q. Okay.

A. It's 25 for 4 percent; it's 20.35 for 5 percent.

Q. Uh-huh.

A. 20.35 and it is 17.12 for 6 percent.

Q. Okay, tell me how those multiplier numbers were arrived at.

A. By using either the formula for converting that stream of annual payments to a net present value by using tables which give you that number or by using a calculator which will also give you that number.

Q. All right, can you give me the formula?

A. Not offhand, I can't, no.

Q. Okay, did you use the formula or the tables?

A. I used the calculator.
Q. Okay, do you want to describe how you did that?
A. You use a financial calculator that is capable of performing --
Q. Oh, one of those --
A. -- that function.
Q. Describe to me in theory how it works.
A. In theory how it works?
Q. Yeah.
A. It takes the stream of annual returns and discounts that to a net present value using the appropriate discount rate.
Q. So to turn it on its head, the present value of $1987 discounted at 7 1/8 percent would give you an annual payment of $136.83?
A. Correct.
Q. Over 100 years?
A. Right.
Q. Okay. And on the other tables that you provided us yesterday for different discount rates, you would just use these other factors?
A. That's right.
Q. All right, where do we go from there?
A. Where do you want to go from there? What do I do?
Q. The next step in your analysis.

A. Okay, I took the net present value for each project area.

Q. Right.

A. And they are repeated on the first column of Table 5 in Dornbusch Exhibit 6.

Q. Uh-huh.

A. And that number is then divided by the systems cost to determine the benefit-cost ratio. The systems cost is shown in the second column. The benefit-cost ratio in the third column.

Q. Okay. I bet you know what the next question is going to be: Where do the system costs come from?

A. Woldezion Mesghinna.

Q. The whole works, he just gave you a final present value?

A. No.

Q. Okay, what did Wold give you?

A. Wold gave me normalized prices for each of the components of the system cost, and his prices included labor, fully costed, and we made adjustments for the opportunity cost.

Q. Do you have with you a copy of the prices and information that Wold gave you?

A. Yes, I do. Would you like a copy?

Q. Yes, please.

A. Okay.

Q. And while we're at it, your computations to adjust the labor charges.

A. Okay, I can give you the numbers which are the adjusted numbers. The computations are -- were done on a calculator.

Q. Okay.

A. Without writing down intermediate numbers.

Q. Okay, does the information from Wold have the normalized prices, including fully costed labor?

A. They do.

Q. Okay, can we have a look at that stuff?

A. Okay.

MS. SLEATER: Wold gave you that?

THE WITNESS: Yes.

MS. SLEATER: Okay. He's so talented.

THE WITNESS: Regina, can I speak with you?

(Off-the-record discussion.

(The instruments hereinafter (described were identified as (Dornbusch Deposition Exhibits (Nos. 21 and 22, respectively.

MR. MERRILL: Let's go back on the record.

Q. (By Mr. Merrill) Dave, do you have the sticker copy of Dornbusch Exhibit 21 in front of you?

A. No, where is 21?

Q. There it is.
A. Yes.
Q. Okay, would you identify that, please?
A. Okay, Dornbusch Exhibit 21 presents a series of installation costs and operation costs for each of the five project area irrigation systems. The numbers -- Oh, there are normalized prices.
Q. Okay.
A. The numbers on Rows 1 through 5 and 10 through 12 are from Woldezion Mesghinna.
Q. Okay, where are the numbers for Column 6?
A. For Column 6?
Q. I mean, excuse me, Row 6.
A. Row 6, I calculated Row 6.
Q. Okay, did you calculate the other rows in which the numbers are blank right now?
A. I did.
Q. Can we see a copy of the whole chart that includes Wold's numbers as well as the ones you calculated and the total installation and operation costs?
A. They are included on Dornbusch Exhibit 22, which I gave you.

I did not calculate those numbers prior to the final summation, which is on Dornbusch 22.

Q. Do you have Exhibit 22 in front of you?

A. I do.

Q. Okay, why don't you go ahead and identify that one because I've got some questions between the two of them.

A. Okay, Dornbusch Exhibit 22 is the same format as Exhibit 21.

Q. All right.

A. However, it includes completely filled in rows and columns and it included adjustments to correct for the opportunity cost of labor as well as the adjustments necessary to calculate the net present value, whereas on Exhibit 21 the numbers in Rows 10, 11 and 12 are not net present value, but annualized costs.

Q. Are the four pages of Deposition Exhibit 22 for different discount rates?

A. They are.

Q. Okay, would you give me the discount rate for each page?

A. They are the same discount rates that we talked about before.

Q. Okay, which one is Page 1, what rate?

A. May I see the exhibit?

Oh, 7 1/8 percent is Page 1.

Q. Okay.

A. The table is covering the rates up in the corner.
Page 2 is 4.
Q. Okay.
A. Page 3, 5; Page 4 is 6 percent.
Q. Thank you.
A. You're welcome.
Q. Deposition Exhibit 21 is the information that Wold gave you, is that right?
A. As I explained, I explained what information he gave me. He gave me all of the information on this except for the fencing costs.
Q. Okay.
A. That I entered myself.
Q. Did he give it to you in essentially the form it is listed in Exhibit 21 by cost by project area?
A. Yes.
Q. Okay.

THE WITNESS: Excuse me. I wonder if I could ask you not to smoke?

MR. SOMMERS: Sure.

THE WITNESS: It is beginning to get to me. Thanks.

Q. (By Mr. Merrill) Okay, you determined the fencing costs on Deposition Exhibit 21?
A. I did.

Q. Okay, do you want to explain how you did that?
A. Yes, one of my staff in consultation with Woldezion and perhaps others at Stetson Engineers determined where the locations of fences would be necessary. He then measured the fencing and we determined the fencing cost per acre.
Q. Did you take the total cost of fencing a project and then divide it by the number of acres to be irrigated under that project to allocate the fence costs to each acre?
A. That's right.
Q. Okay, what cost did you use per foot or mile or however you used it for fencing?
A. We used a cost of $1440 a mile.
Q. What kind of fence is that for?
A. I believe that's a permanent steel fence.
Q. Like chainlink or something else?
A. I don't know what the precise description of it is; I don't recall what the description of it is, but it is a permanent steel fence. I don't have a description of it with me.
Q. Do you know how the cost per mile was derived?
A. Yes, I believe I do.
Q. Source?
A. Source is Montana Agricultural Extension Management

Guide for fencing costs on grazing lands.

Q. Montana Agricultural Extension Guide for costs of fencing on grazing lands?

A. That's right.

Q. Do you have a date for that?

A. I believe it's 1969, but I'm not sure.

Q. You must have normalized it?

A. Of course. That's why I believe the date on the publication is '69 because --

MR. MERRILL: Ha-ha-ha.

A. That's what is the published price.

Q. Do you have with you the calculations by which you determined the fencing costs?

A. No.

Q. Did you include any charges for fence maintenance and repair?

A. Yes.

Q. Do you have those?

A. Yes. Okay, they are $13 per mile.

Q. For any unit of time?

A. Annual.

Q. How did you arrive at that figure?

A. I believe at the same source.

Q. Okay. So, as I understand it, you or somebody on your staff figured out much fence would be required

for each project, the total number of miles of fencing, then divided that by -- or then figured the cost and divided the cost by the irrigated acres within the project to allocate the fencing cost to each acre?

A. I'm sorry, I wasn't following the question.

MR. MERRILL: Okay, it was a lousy question. Let me try it again.

THE WITNESS: Maybe it is time for a break.

MR. MERRILL: Sure.

THE WITNESS: Let's take one.

MR. MERRILL: Okay, we've got to keep the witness happy.

(Recess, 10:30 a.m. to
(10:49 a.m.

MR. MERRILL: Okay, let's go back on the record.

Q. (By Mr. Merrill) We were talking about fencing costs.

A. Right. And I need to make a correction. My source was corroborated on the figure that I obtained from the BIA, for the cost per mile of fences was corroborated by the Montana Agricultural Extension.

Q. Oh, the $1440 per mile came from BIA?

A. That's right.
Q. And was corroborated by the Montana Extension Guide?
A. That's correct.
Q. Okay, who at BIA gave you that?
A. Rich Harbour.
Q. Okay, so what did you do with the $1440" per mile?
A. Well, I should make a correction. Rich Harbour did not give me the $1440" per mile.
Q. Oh.
A. Rich Harbour gave me $2240" per mile, of which $1,000 is for labor, and I adjusted for the opportunity cost.
Q. I'll bet you took 20 percent.
A. That's right.
Q. So you costed your labor at 22 percent?
A. Twenty percent.
Q. Twenty percent, right.

Okay, so you would have subtracted one thousand bucks from it?

A. Eight hundred.
Q. Okay, subtracted $1,000, added $200 back, so that got you to the $1440" per mile?
A. That's right.
Q. Okay, so you verified $2240" with the Montana

Extension Guide?

A. That's right.

Q. Do you know the basis of Rich Harbour's $2240 that he gave you?

A. I think it is based on $7 per rod.

Q. Do you know where he got that number?

A. I do not.

Q. Did he give you the $7 a rod or the $2240?

A. I'm not sure.

Q. How many rods are in a mile?

A. I believe that each rod is 16 1/2 feet.

Q. Three hundred twenty rods in a mile?

A. Correct.

Q. Times $7 a rod is $2240.

In determining fencing costs of an agricultural -- or an irrigated agricultural project, would it be reasonable for an expert such as yourself to rely on a person like Rich Harbour to give you fencing costs per distance and then verify that with a source such as the Montana Agricultural Extension Guide?

A. I believe so.

Q. Okay, what did you do with the $1440 per mile?

A. I determined how many fence miles were required for each project area,

Q. And then what?

A. Divided it by the number of acres in the project area to determine the miles per acre.

Q. Then what?

A. Multiplied by the miles -- the mile per acre by the cost per mile.

Q. To give you cost per acre.

A. Installation cost per acre, right.

Q. Do you have a copy with you of the sequence of numbers that you just described?

A. Oh, I can read them off to you.

Q. Well, my question was do you have a copy with you?

A. Of what specifically?

Q. Of the determination of fence miles per area, the number of areas and each acre resulting calculation?

A. The number of areas in each area?

Q. Excuse me, the number of acres in each area and so forth.

A. I have the fence miles per project area.

Q. Uh-huh.

A. The acres in each area, the miles per acre in each area and the dollars per acre in each area.

Q. Will you check with your attorney and see if we can make a copy of that, please?

MS. SLEATER: How do you feel about it?

THE WITNESS: Sure.

MS. SLEATER: Okay.

(Off-the-record discussion.

MS. SLEATER: Just tell him if he's going to go through all of them, that's fine.

THE WITNESS: Is it okay?

MS. SLEATER: Uh-huh.

THE WITNESS: All right.

Q. (By Mr. Merrill) Before you turn that over, we might as well talk about the maintenance cost and any other costs that are figured into the fencing. Are those also shown on the documents that you've got there?

A. Yes, they are.

Q. Can we go ahead and get all that at one crack to save breaking it up?

A. Yes, you may.

MR. MERRILL: Great.

(Off-the-record discussion.

(The instrument hereinafter (described was identified as (Dornbusch Deposition Exhibit (No. 23.

MR. MERRILL: Let's go back on the record.

Q. (By Mr. Merrill) Dave, in front of you I have put Dornbusch Exhibit 23. Would you describe that, please?

A. It includes the cost calculations for fencing for each of the project areas.

Q. Using the North Crowheart area as an example, would you describe the series of computations to arrive at the fencing cost per acre in the North Crowheart area?

A. Okay, there were 242 fence miles.

Q. How was that determined?

A. By sketching on a map or drawing on a map the locations of fences required and then measuring them from the map and scaling to determine the fence miles.

Q. Did somebody in your office do the drawing and the scaling?

A. Yes.

Q. Do you have copies of the maps with you?

A. Yes, I do.

Q. May I have those for each area?

A. No, you may not; they are my originals.

Q. Can we make copies?

A. Yes, you may make copies, if you like.

MR. MERRILL: Okay.

Holy smoke!

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) I'm looking at a map that's called Wind River Indian Reservation, Wyoming, Proposed

Irrigation Project, Big Horn Flats Unit, Conceptual Irrigation Development Plan by Stetson Engineers. It is also marked Big Horn Flats 2 of 2.

A. Yes.

Q. There are several areas on the map shaded with vertical lines and outlined in black. Are those the irrigation areas?

A. I believe they are.

Q. What is the significance of the red lines around those areas?

A. I believe the red lines are the fences, indication of where the fences would go.

Q. Okay, would that same scheme go for each of the plates that you have given me?

A. Yes, I believe it would.

Q. Okay, from whom did you receive the maps on which the red lines are drawn?

A. From David May of my staff.

Q. Do you know where he got them?

A. Where he got the original maps?

Q. Uh-huh.

A. I believe he got them from Stetson Engineers, but I'm not sure.

Q. Do you know about when he would have gotten them?

A. No.

Q. Okay, if it's agreeable with you, we'll make blue line copies of these rascals during lunch and come back and identify them later so we can keep going.

A. That's fine with me.

Q. Okay.

A. Please be careful. There are some pieces that are rather small or at least one that's only about maybe 8 inches by 10 inches.

Q. Okay.

A. So watch out when you unroll them that it doesn't get -- fall out and get lost.

MR. MERRILL: Okay, we'll do our best not to lose them.

(Directed to Mr. Sommers) Give them to our blue line outfit and see what he can do.

Q. (By Mr. Merrill) So somebody on your staff took the red lines, marked around all of the North Crow-heart areas and added them up and came up with 242 fence miles?

A. That's right.

Q. Okay, where did the 38,764 acres come from?

A. I believe that came directly from Stetson Engineers.

Q. Okay, is that figure to represent the number of acres against which the actual charge for fencing

is to be applied?

A. Yes.

Q. Is that irrigated acres?

A. I believe it is. It is the acreage which is the basis of our acreage calculations, and I believe it includes all of the irrigated acreage.

Q. Miles per acre is determined by simply dividing fence miles by acres in each project?

A. Yes.

Q. Dollars per acre is determined by multiplying -- Well, strike that.

Why don't you tell me how dollars per acre is determined because I'll bet I don't know.

A. I bet you do. I just told you. You multiply miles per acre times dollars per mile and you get dollars per acre.

Q. Okay, did you use $1440 as dollars per mile?

A. Yes, I did.

Q. Okay. So the dollars per acre figure listed in the chart on Dornbusch Exhibit 23 is the installation charge, is that right, per acre?

A. The dollars per acre includes two costs; one is installation, the other one is annual repair.

Q. Okay.

Q. Both are presented.

MR. MERRILL: Okay, let's go off the record for a moment.

(Off-the-record discussion.

MR. MERRILL: Back on the record.

Q. (By Mr. Merrill) Tell me again how you dealt with the annual repair estimate. I'm not clear on putting that -- the $13 per mile together with the $1440 per mile installation charge.

A. It's not put together, they are handled separately.

Q. Okay. So the installation charge is simply the $1440 per mile times the miles per acre in a particular project?

A. Say that again.

Q. The --

A. Installation charge?

Q. Right.

A. Is what?

Q. $8.93 in North Crowheart you get by simply multiplying the miles per acre in North Crowheart by $1440 per mile?

A. Right.

Q. Okay. And the annual repair would be multiplying miles per acre by $13 per mile?

A. Same way, that's correct.

Q. Okay. Now, how did you work from these numbers back

to the fence charges shown on Dornbusch Exhibit 22?

A. Okay, you can see that first -- excuse me, I entered the rounded numbers for installation on Dornbusch Exhibit 21, rounded to the nearest dollar.

Q. Okay, I get it.

A. Okay, and then made the adjustment from the normalized price to the present value which is shown on Dornbusch Exhibit 22.

Q. How was that done?

A. It's done by determining the factor which would convert the normalized price to the present value and multiplying by that factor.

Q. So it is back to the multipliers that you gave me before?

A. The multipliers that I gave you before? Which ones are you talking about?

Q. The ones that you read off earlier this morning for the four different discount rates.

A. Are you referring to my conversion of an annualized --

Q. Uh-huh.

A. -- return to present value?

Q. Yeah.

A. No, those are annual returns; these fencing costs are not annual.

Q. Okay.

A. The installation cost is incurred only once every 25 years.

Q. Okay. So at Year 1 and Year 26, Year 51, Year 76, you have costs of putting up a new fence, right?

A. Every 25 years.

Q. Okay, and you took those costs over the future and brought them back to a present value?

A. That's right.

Q. Using each of four discount rates?

A. That's right.

Q. All right, I'm catching on.

MR. WHITE: What kind of fence lasts 25 years?

MR. MERRILL: A permanent steel fence.

MS. SLEATER: A big fat fence.

MR. WHITE: God, I would hate to string it.

Q. (By Mr. Merrill) Do the present value figures on Dornbusch Exhibit 22 also reflect an annual repair of $13 per mile discounted back to a present value?

A. Which exhibit -- Excuse me.

Q. Okay, Dornbusch 22 has the present values --

A. Right.

Q. -- of the fence?

A. Right.

Q. Charges over the future, and you said one component of that was the fact you've got to put up a new

fence every 25 years?

A. Right.

Q. Okay, so another component of the fact is that you've got to spend $13 per mile to keep the fences in shape?

A. It would have been included had I not determined that that cost is negligible compared to the other costs and I felt it wasn't worth carrying out the calculations, so I omitted it.

Q. Okay, so the present value fence charges on Dornbusch Exhibit 22 reflect only the cost of putting up a new fence every 25 years and do not reflect maintenance charges, is that correct?

A. That's correct.

Q. Okay, is it your opinion that the maintenance charges are so insignificant as to not change the substance of the calculation?

A. That's correct.

Q. All right, did you actually take one of the calculations through with maintenance charges to see the magnitude of the difference?

A. Yes, I did.

Q. What was it?

A. I don't recall.

Q. You ran it out on a calculator and decided to heck

with it?

A. That's right.

Q. Okay, Wold gave you the figures for the first five rows of Dornbusch Exhibit 21, is that right?

A. That's right.

Q. And you just told me how you figured the fencing costs.

A. Right.

Q. The next one down is under installation and operation costs, O & M & K, is that --

A. O & M & R.

Q. And R, operation, maintenance and repair?

A. Yes.

Q. Did you figure those out?

A. No, Wold gave me those, as he did for all the rows, numbers in Rows 10, 11 and 12.

Q. Okay, all from Wold?

A. That's right.

Q. You took the figures from Wold and didn't modify them at all, just wrote them down in the appropriate columns on Dornbusch Exhibit 21?

A. That's right.

Q. Okay. Now, would you describe for on-farm systems North Crowheart how you got from $125 in Dornbusch 21 to $194 in Dornbusch 22?

A. Okay, the price shown or the figures shown on normalized price table, Dornbusch 21, is the initial investment for the on-farm system. The on-farm system has an expected life of 15 years, no salvage value is assumed. And using the type of calculation which I described before where you have a series of investment over time, we determined what the net present value was for the on-farm system using that calculation for each of the interest rates that we have talked about before, and each of the tables in Dornbusch 22 reflects that net present value for each of those respective interest rates.

Q. Did you have a table or some copy of those calculations that shows the path from Dornbusch 21 to Dornbusch 22?

A. It was all done on a calculator.

(Off-the-record discussion.

Q. (By Mr. Merrill) As I understand it, the calculations between Dornbusch 21 to Dornbusch 22 are like those of the fixed costs in your crop budget where you have a piece of equipment with a certain life span and you replace it each time and bring those costs back to the present value?

A. The principle is the same.

Q. Okay, do you have some tables similar to the ones you gave me for fixed costs of trucks and tractors and so forth that would apply to on-farm systems, pipe networks and so forth?

A. No. As I said, the calculation is done in a calculator. It doesn't have to be broken out into the pieces that I felt were necessary and, therefore, prepared a table for the fixed costs for the farm implements and machinery. So I did not prepare a table which shows the intermediate steps between the two.

Q. Do you have with you the figures you used for the total cost by unit of the various installation costs shown?

A. The total costs by unit? I don't understand your question.

Q. On Dornbusch Exhibit 21 --

A. Yes.

Q. -- under the North Crowheart for the on-farm systems, you have $125.

A. That's right.

Q. Is that dollars per acre?

A. That's right, dollars per acre.

Q. Do you have something showing the total costs of the North Crowheart equipment?

A. No.

Q. That would then be divided by the number of acres in the North Crowheart?

A. No, the numbers that you see in Table 21 are exactly as they were presented to me from Wold; all the numbers that were used in preparing those I did not see. -- Excuse me, together with the numbers that you see in Table 21, I do know what the expected life is for each of those items.

Q. Okay, that was going to be the next question, the life for each of the items.

A. Okay, for the on-farm systems --

Q. Uh-huh.

A. -- 15 years.

Q. All right.

A. For the pipe network, 30 years; pump and pumping plant, 25 years.

Q. Okay.

A. Canals and related structures, 100 years.

Q. Uh-huh.

A. And drainage, 100 years.

Q. Did you develop those figures or did Wold give them to you?

A. Wold gave them to me.

Q. Did he give you any other information with respect

to these various installation costs and the units?

A. He gave me an estimated salvage value for each one, and each was zero.

Q. So the salvage value for each of the Items 1 through 5 for all units was zero?

A. That's right.

Q. Okay, did he give you anything else?

A. Not that I recall.

Q. Okay. So to get from the --

MR. MERRILL: Can I keep going?

MS. SLEATER: Yes.

MR. MERRILL: Okay.

Q. (By Mr. Merrill) Dave, let's take canals and structures under the North Crowheart,

A. Uh-huh.

Q. On Dornbusch Exhibit 21. Would you describe to me how you got from the $252 per acre there to $225 on Dornbusch Exhibit 22?

A. Okay, canals and structures. Let me check something.

(Brief pause.

A. Okay, canals and structures has a labor component in it that in the numbers that Wold gave me were not adjusted for the opportunity cost.

Q. They are fully costed?

A. They were fully costed.
Q. Okay.
A. And the adjustment that I made between those two tables was to remove the component of the labor that is opportunity costed as zero.
Q. Would you run me through that calculation, please?
A. Okay, for canals and structures, Wold estimated that -- I'm sorry, Wold did not estimate this. We estimated from Bureau of Reclamation figures that skilled labor would be 9.58 percent of the total and unskilled labor would be 8.33 percent of the total.
Q. Are you telling me that you folks determined the costs on Dornbusch Exhibit 21 for canals and structures?
A. No, I'm telling you that Wold gave me the figure for canals and structures on Dornbusch Exhibit 21.
Q. Okay.
A. We estimated what the cost of labor was on the percentage of that.
Q. Oh, okay, using the two figures that you just gave me?
A. That's correct.
Q. And those came from Bureau of Reclamation --
A. That's right.

Q. -- something. What was the something? I got as far as Bureau of Reclamation.

A. I don't recall.

Q. Would it be in your notes so that you could find it and let us know later?

A. Well, my notes only tell me that these are the labor components of irrigation systems, construction costs, and I don't recall the source.

Q. Okay, what did you do then with these two percentages?

A. Okay, I took 8.33 percent of 252.

Q. Okay.

A. And I determined what 80 percent of that figure was.

Q. Okay.

A. That represents the zero cost of opportunity cost of labor; then I took 9.58 percent of 252.

Q. 9.58?

A. 9.58.

Q. Okay.

A. And I then took 43 percent of that and determined that that is the amount of labor which is costed as zero opportunity costs.

Q. Zero opportunity cost for skilled labor?

A. Right. Summed the two numbers of the zero opportunity costs and subtracted from 252, and I believe that the sum was for canals and structures was 7 1/8

percent was $27. $252 less $27 is $225, which is the figure on Dornbusch Exhibit 22.

Q. Would that process of adjusting for the zero opportunity costs, skilled and unskilled labor, be the same regardless of the discount rate?

A. Yes.

Q. Okay, why did you adjust the opportunity cost for skilled labor by 43 percent?

A. Because that is the amount of the labor component which I determined to be the amount which could be drawn from the unemployed resources on or near the reservation.

Q. At a zero opportunity cost?

A. That's right.

Q. Okay, how did you determine 43 percent?

A. That is a number that is suggested by the Water Resources Council as the amount which they found to be the attainable percentage of skilled labor that could be drawn from unemployed people in the survey they performed applicable to construction projects.

Q. Did you pull this figure from a guide or a publication of theirs?

A. I did, and I can't recall which particular one it was.

Q. It is not in your notes or anything?

A. No.
Q. Okay, it wouldn't be the January, 1980?
A. I wouldn't venture a guess.
Q. Do you have labor cost adjustments for each of the other components for the installation costs?
A. Well, I made the adjustments, that's how I got Table 22.
Q. Okay. So each of the items on Table 22 had been adjusted to factor in the zero opportunity cost labor charge?
A. The items that are -- the portions of the construction budget which are the four items: pipe networks, pumps and pumping plant, canals and structures and drainage, were adjusted as you described.
Q. Okay, do you have with you notes showing the computations for the labor charge adjustment for each of those four -- each of the areas?
A. As I said before, I do not.
Q. These were all done straight on the calculator?
A. Yes.
Q. Throughout the calculations did you use 80 percent as your unskilled labor which could be attained at zero opportunity cost?
A. I did.
Q. Forty-three percent for the skilled?

A. Correct.
Q. Would it be possible, using the notes back at your office, to determine the name of the WRC source you used to get the 43 percent?
A. I expect it would.
Q. Could you make a note of checking that and letting us know the name so that we can go back and find it, please?
A. Okay, I'll make a note of that.
MR. MERRILL: Thank you.
Q. Did you use the same percentages, that being 9.58 for skilled labor and 8.33 for unskilled labor throughout your labor charge adjustments?
A. No, I used different numbers for the other construction components.
Q. Okay.
A. Would you like to know what they are?
Q. Uh-huh.
A. For pipe network, skilled, 3.22 percent.
Q. Uh-huh.
A. Unskilled, 3.38 percent. For pump and pumping plant, skilled, 11.77 percent.
Q. Uh-huh.
A. Unskilled, 9.43 percent.
Q. Okay.

A. For canals and related structures and drainage, 8.93 percent, skilled; 13.2, unskilled.

Q. And where did you get those percentages?

A. I believe they all came from the Bureau of Reclamation.

Q. While you're at it, would you dig up the title of that source so that you can relay it to us?

THE WITNESS: Is it necessary?

MS. SLEATER: I don't think so.

Q. (By Mr. Merrill) Did you rely on that source in determining the appropriate amounts by which to cost the labor at zero opportunity cost, skilled and unskilled?

A. Did I rely on the source?

Q. Yes.

A. I don't recall. I expect I did, but I'm not sure. I don't remember the origins of those percentages precisely.

MR. MERRILL: Regina, are you instructing him not to let us have the source on which he relied?

MS. SLEATER: Well, Jim, I think you're entitled to know what Dave had relied on as he remembers it. If I recall, it was the instruction you gave your witnesses. It is a public document that he's described as fully as he is able. I'm

certain that you will have no problem locating it from his descriptions and I'm sure that you already have it.

MR. MERRILL: His description is simply that it came from the Bureau of Reclamation; that doesn't narrow the field very much.

MS. SLEATER: Well, he's telling you what information is in it.

MR. MERRILL: So you are instructing him not to give it to us?

MS. SLEATER: I'm instructing him to tell you whatever he remembers about whatever he relied on at this deposition.

MR. MERRILL: My question to him was whether he would check back at the office and let us know the name of the exact publication on which he relied.

MS. SLEATER: I don't believe those were your exact words. The purpose of the deposition is to find out what he remembers and what he relies on to the best of his memory. It is not a continuation to be continued in his office forever.

MR. MERRILL: So you are telling him not to let us know?

MS. SLEATER: I think so, yes.

MR. MERRILL: Okay.

Q (By Mr. Merrill) Okay. So, as I understand it, you adjusted the costs shown on Dornbusch Exhibit 21, Items 2 through 5, using the method you just described and the percentages for skilled and unskilled labor that you just described, and the results of that adjustment are shown on Dornbusch Exhibit 22, Lines 2 through 5 for the five units?

A. If I followed you correctly, I believe that's right.

Q. Do you want me to run through it again so you can be sure?

A. Well, if you mentioned the -- Well, go ahead, why don't you run through it again?

Q. Okay. Exhibit 21, Lines 2 through 5 --

A. Yes, right.

Q. Then adjusted to reflect the zero opportunity costs of skilled and unskilled labor --

A. Uh-huh.

Q. The results of that adjustment are shown in Lines 2 through 5 of Dornbusch 22?

A. No, you forgot to mention the accounting for the present value.

Q. Oh, okay.

A. I described that earlier.
Q. So Dornbusch Exhibit 21 -- excuse me. I'll start over again.
A. Yes.
Q. Dornbusch 21 accounted to present value and adjusted to zero opportunity cost labor yields the numbers off those Rows 2 through 5 of Dornbusch 22?
A. Right.
Q. Okay, the on-farm systems were adjusted only that account for present value and not for zero opportunity cost labor?
A. Correct.
Q. Okay, where did the numbers on Line 6 of Dornbusch Exhibit 22 come from?
A. Line 6?
Q. Uh-huh.
A. Is 25 percent of Lines 2 through 5.
Q. Oh, okay. Why did you make that calculation?
A. That represents contingencies and engineering.
Q. Who decided to take 25 percent of those particular items for contingencies?
A. Stetson Engineers.
Q. Anybody in particular?
A. I'm not sure.
Q. All they told you was to take those four items and

take a quarter of the costs?

A. That's right.

Q. Okay, and the fencing costs on Dornbusch 22 you've already described?

A. Right.

Q. Okay, how about land prep?

A. Land preparation is $30 an acre on all of the tables.

Q. Who determined that figure?

A. That figure was estimated on the basis of a telephone conversation I had with Tim Keller.

Q. Who is Tim Keller?

A. He is in the Field Planning of the Bureau of Reclamation, Billings office.

Q. What did Mr. Keller tell you?

A. He told me that there is a first year cost involved in preparing land that was nor formerly irrigated --

Q. Uh-huh.

A. For ittigated lands, croplands,

Q. Okay.

A. And that an appropriate figure is in the range of $25 to $30 an acre for that preparation.

Q. Is that figure specific to a particular area or region or is it a nationwide figure?

A. No, it's a figure that he explained was applicable to lands like the lands we have. In fact, it is

probably very conservative for our region.

Q. In discussing the projects and the land preparation costs with him, how did you characterize the area we're talking about? Did you tell him there's a certain amount of Class 1, Class 2, Class 3 land?

A. No, I think our conversation with regard to the type of land we had was primarily restricted to brush, the amount of sagebrush.

Q. So this would represent the cost of getting that brush out of the ground and off of the site?

A. Part of it, yes.

Q. Okay, any other particular items that that cost would include?

A. It includes breaking up of the soil.

Q. Okay, anything else?

A. No.

Q. No land leveling cost?

A. Well, I guess I should be more specific. I asked him for the costs which would include all of the required operations to prepare the land, and he gave me those two general categories. Whether or not breaking up of the soil included leveling as well, I can't be sure, but I made it clear that I wanted the full costs and he stated that he gave me the full costs.

Q. Okay, so you called up Tim and you told him you wanted all of the operations, the cost of all of the operations for preparing previously unfarmed land to irrigated agriculture?

A. I asked him for an appropriate estimate for the cost of preparing land that was not previously irrigated.

Q. Okay.

A. That was previously just grazing land to irrigated agriculture, yes.

Q. Okay, he gave you $25 to $30 per acre and you took $30?

A. Right.

Q. All right, did you verify that number by consulting any other source?

A. No.

Q. Okay, do you believe it is reasonable to rely on somebody like Tim Keller to give you land preparation cost for previously unirrigated land?

A. Yes, I do.

Q. Okay, is there any other factor that you considered in deciding to put $30 per acre in for a land preparation charge for each of the five projects?

A. I considered such things as land leveling and the fact that we might expect yield reductions in the

early years and the fact that perhaps the cost of operations in the early years might be somewhat higher.

Q. How did you take into account land leveling?

A. I did not.

Q. You just told me a moment ago that you considered land leveling.

A. That's right.

Q. Well, how did you do it?

A. How did I do what?

Q. Consider land leveling.

A. I queried Tim Keller as to whether or not I should consider those other factors as well, and he said there are other alternative means of accounting for the land preparation cost.

Q. What methods are those?

A. He didn't specify; he said but the other methods might -- the other methods would include consideration of those other factors. He said you could attempt to estimate lower yields and things like that. He said, however, the $30 an acre represents one of the alternative means of estimating preparation costs, which is appropriate, and suggested that that be one that I could use.

Q. Okay, does that $30 per acre take into account the

possible reductions in yield and higher costs associated with the early years of production?

A. As I said, there are alternative means which include the lower yields. And, from my understanding of the discussion, if you do that, that plus the other costs for preparing the land would yield a figure which would be comparable to the $30 --

Q. Oh.

A. -- initially or less.

Q. Did you do any other investigation or figuring which took into account yield reductions or higher costs for the early years?

A. I did not do other calculations, no.

Q. Okay. So if they are included in the $30 per acre, they are there; and if they are not, they are not?

A. No, I don't think that's a fair way to characterize it. As I said, there are alternative means for estimating the cost, the initial cost for preparing land for irrigated agriculture and the various methods would arrive at a figure, or different figures.

Q. Uh-huh.

A. It was Tim Keller's opinion that using a figure of $30 per acre would account for those costs,

whether you calculated them one way or another.

Q. Oh, okay. So the $30 per acre does somehow take into account all these other factors?

A. All of the factors that would be required to prepare the land, yes.

Q. Okay, does it take into account yield reductions?

Maybe I'm hammering at that point. I'm not sure I understand.

A. Yes, I think you are.

MR. MERRILL: Do you want to take a break?

THE WITNESS: I'll repeat the answer that I gave you before and ask that you accept that as my answer.

MR. MERRILL: Okay, I'm not trying to harass you.

THE WITNESS: If it's not clear, then please identify the part which isn't clear and I'll get into it.

Q. (By Mr. Merrill) What I'm not clear on is Tim told you that there are other ways to figure the land preparation costs and also to take into account land leveling, yield reductions and higher costs associated with the early years of production. What I'm wondering is, does -- then he said that, as I understand it, that the $30 per acre charge

would get you essentially the same result, although there might be some variation, but depending upon which method you used to calculate --

A. There are alternative means of calculating the initial charge.

Q. Okay.

A. $30 an acre is an estimate which is representative of the alternative means for calculating that charge.

Q. Okay, what I'm trying to find out is whether the $30 takes into account not only the land preparation and leveling charges, but does the $30 also somehow account for an estimate of higher costs and possibly lower yields?

A. I believe implicitly it does.

Q. Okay, that solves my problem.

MS. SLEATER: Are you getting hungry?

THE WITNESS: Shall we take a break for lunch now?

MR. MERRILL: Sure.

MS. SLEATER: Jim, I have a problem. I have a conference call at 1:00 that I don't know -- I mean, it shouldn't take more than a half an hour.

MR. MERRILL: Okay, 1:30?

MS. SLEATER: (Nodding head affirmatively).

MR. MERRILL: Okay, good enough.

(Recess, 11:50 a.m. to 1:42 p.m.

* * * * *

Afternoon Session

* * * * *

MR. MERRILL: We're ready whenever you are, Dave.

THE WITNESS: Okay, I'm ready. And I have the reference for you on the source of labor proportions --

MR. MERRILL: Okay.

THE WITNESS: -- on the construction items that was the bone of contention before we departed for the day.

MR. MERRILL: Is that the Bureau of Reclamation one?

THE WITNESS: Right.

MR. MERRILL: Okay.

THE WITNESS: Do you want to put that on the record?

MR. MERRILL: Sure.

THE WITNESS: Okay, the source for the percent labor components for the various construction installation items is a working paper by the Bureau of Reclamation, E & R Center in Denver. It is

called "Reclamation Construction Impact for Each One Million Dollars of Appropriation", January, '77.

MR. MERRILL: Thank you, Dave.

THE WITNESS: You're welcome.

MS. SLEATER: It is amazing how nice we get after a nice lunch.

THE WITNESS: Speak for yourself.

Okay, next?

MR. MERRILL: Are you ready to go?

THE WITNESS: Yes.

Q (By Mr. Merrill) Dornbusch Exhibit 22, "Discount to Time", Line 9.

A Okay.

Q Would you explain what those are and how you got them?

A Yes, this is the same type of operation that we have performed under names, such as overhead interest and that sort of thing.

Q Okay.

A What we are doing is moving the construction costs up to Year Zero, and this cost figure represents that movement.

Q This is the cost of money over time to shift to the first year of production?

A That's right, at Year Zero.

Q. Okay. And how do you calculate that number?
A. Okay, each construction operation will be performed over a period.
Q. Uh-huh.
A. And the cost for that period is then used in time using the present value calculation.
Q. Do you have some sort of list and timetable of the construction operations?
A. I can tell you what they are.
Q. Okay.
A. For North Crowheart the construction period is a three-year period.
Q. Okay.
A. The on-farm, fencing and land preparation cost items will all be performed in the period May -- I'm sorry, June through October -- or those costs will be incurred June through October.
Q. Okay.
A. The pipe networks will be constructed during May to October during a two-year period. The pumps and pumping plant will be performed over a three-year period, May to October. The canals and related structures will similarly be constructed over the three-year period, again May to October. The drainage system will be constructed over a

two-year period, May to October. The two years prior to Year Zero. And the contingencies include a cost for engineering, which is 6 percent of the 25 percent. Let me state that clearly: It is 6 percentage points of the 25 percent; in other words, it is not 6 percent times 25 percent. There is an engineering cost of 6 percent, the remainder being 19 percent which will be incurred in the four years prior to your Year Zero, and the contingencies then being spread over the three years.

Q. Let me make sure I have that right, Dave.

A. Right.

Q. The 6 percent you're speaking of is 6 percentage points of the 25 percentage points?

A. Right.

Q. That are described in Line 6?

A. Right.

Q. Okay, what was the time on that, I'm sorry?

A. Oh, the engineering is incurred four years prior to Year Zero and the remaining contingencies are spread over May to October of another three years, construction period years.

Q. So the 19 percent of the engineering and contingencies is May to October for the three years prior, is that right?

A. Right.
Q. And the remaining 6 percent of 25 is incurred four years prior?
A. Right.
Q. Okay.
A. The engineering is incurred prior to any construction. Okay, that completes all of the items in installation costs.
Q. Okay, you identify those as being for the North Crowheart. Do they change for the other units?
A. Oh, yes, for all of the other four units construction takes place entirely in the year prior to Time Zero. It is a one-year construction period except for engineering which occurs in the year prior to that.
Q. So it would be two years before Time Zero?
A. Right.
Q. That's for all the other four units?
A. Correct.
Q. And you said "all construction". That means the unfarmed land preparation and fencing, pipes, pumps, canals and drainage?
A. Right,
Q. Okay.
A. And contingencies, the remainder contingencies.

Q. Who determined this construction schedule?
A. Tom Stetson.
Q. Did he just feed it to you in essentially this form?
A. That's right.
Q. Okay, Dave, is the 19 percentage nearing -- is 6 percent engineering? -- Let me start over. Is the contingency, which is 6 percent of 25 percent from Line 6, has that occurred continuously over the four years?
A. No. Of the 25 percent --
Q. Uh-huh.
A. -- 10 percent is engineering.
Q. Oh, 10 percent is engineering. I thought you just said earlier that 19 percent was engineering and 6 percent was contingencies.
A. Let me explain it again. Of the 25 percent, 10 percent is engineering.
Q. Okay.
A. Six percent is incurred before any construction occurs; the remaining 4 percent of the engineering is spread over the construction of the project.
Q. Okay.
A. The rest of the contingencies are also spread over

the construction project.

Q. Okay, I'm clear on that.

Okay. Now, how do you use that construction schedule to bring these costs back to a present value?

A. Okay, I assumed for calculation purposes that all of the construction costs, although they are spread over the period May to October, would occur at the midpoint of that period, would occur -- would be incurred at the midpoint of that period. Some being obviously incurred later, some being earlier. And from the midpoint of the period, I discounted that total quantity incurred in that period, two times zero.

Q. What is the midpoint date that you used?

A. Let me see. June, July, August, September, October -- so it would be two and a half months from May 1st.

Q. July 15th?

A. Mid-July, that's right.

Q. Okay. So for all of the operations that are spread from May to October, you took those costs as of July 15th and brought them to the present?

A. That's right.

Q. Okay, using whatever discount rate is applicable

to the particular page of Dornbusch Exhibit 22 we are looking at, is that right?

A. Say it again, please.

Q. Using the appropriate discount rate, depending on which Dornbusch Exhibit 22 analysis we're looking at --

A. Yes.

Q. -- because we have four different rates.

A. That's correct.

MR. MERRILL: Okay, are you clear on that one, Craig?

MR. SOMMERS: (Nodding head affirmatively).

Q. (By Mr. Merrill) Okay, let's move on to Line 10 of Dornbusch Exhibit 22.

A. Okay.

Q. What do the numbers in that line represent?

A. Those numbers are operation, maintenance and repair of the systems -- of the constructed system.

Q. How are they determined?

A. First, I make an adjustment to Wold's costs for the labor component, adjusting it to the opportunity cost of labor, and then I discount those annual costs to net present value, just as I have done before.

Q. What percentages did you use to adjust Wold's

labor costs?

A. Eighty percent.

Q. Across the board?

A. Yes.

Q. Okay, did that 80 percent apply to the entire $6.84 that Wold gave you for the North Crowheart, is that all labor?

A. No, only a portion of that is labor.

Q. What portion is labor?

A. Okay, for North Crowheart the labor component is $3.10, to which we apply the 80 percent.

Q. Okay, are the other units different?

A. For South Crowheart, Riverton East and Arapahoe, it is $8.04 per acre; and for Big Horn Flats, it is $2.01 per acre.

Q. Who determined the labor component of the operation and maintenance and repair charges?

A. Wold or someone else at Stetson Engineers.

Q. Okay. So, using the North Crowheart as an example, you would reduce the labor component, being $3.10, by 80 percent, add that back to the difference between $6.84 and $3.10 and then discount that value back to a present value at the appropriate discount rate?

A. Say that again. I lost you in the "add back".

Q. Okay, let me try it in littler bits.

Wold gave you $6.84 for operation, maintenance and repair?

A. Right.

Q. And also told you that $3.10 of that amount is the labor component?

A. Right.

Q. You assumed that 80 percent of the labor would come without an opportunity cost, so did you discount -- discount is not the right word -- reduce the $3.10 labor component by 80 percent?

A. Right.

Q. And that left you with some number?

A. Right.

Q. Do you have a number in front of you that you could tell me what it is?

(Brief pause.

THE WITNESS: Why is this dropping?

A. Okay, yeah, it is $2.48 is 80 percent of $3.10. I could do that in my head, but my calculator was worrying me.

So $2.48 was subtracted from $6.84.

Q. (By Mr. Merrill) Okay.

A. And the remainder was multiplied by the appropriate factor to convert annual cost to net present value.

Q. Okay, which factor do you use to bring it back to a present value?

A. Those are the same factors that I used to take the annual returns to a net present value that were on Table 4 of Dornbusch 18, I guess -- no, not Dornbusch 18.

Q. Six is the one we've been using for 7 1/8 percent.

THE WITNESS: What is the master for 18?

MR. MERRILL: Six, I believe.

THE WITNESS: Six. Then it is No. 6.

MS. SLEATER: I don't have 6.

THE WITNESS: Anyway, they are the discount rates -- excuse me, it is the factor which converts an annual stream of costs or revenues for a 100-year period back to the present value.

Q. (By Mr. Merrill) Okay, I think I got that one.

Was anything else done to determine the numbers shown for O, M and R, Dornbusch Exhibit 22?

A. No.

Q. Okay, what's the difference between energy and power, the next two line items?

A. I think we -- I believe what the difference is is that the energy is the actual charge for energy consumed and power, I think, is Wold's term for the connection, the annual cost charge which

is set according to the horsepower level. But I think for the best explanation you should talk to Wold.

Q. Okay, if that is the case, that the energy represents the cost dependent on use and power represents the hookup charge, is that analagous to fixed and variable costs?

A. Well, I think you better talk to Wold about it.

Q. Okay.

A. I'm not sure how he calculated that number.

Q. He just handed you the numbers?

A. That's right.

Q. Did you do anything to Wold's numbers other than discount them back to a present value using those factors you described earlier?

A. No, I did not.

Q. Is Column -- excuse me, Row 13 on the bottom of Dornbusch Exhibit 22 the arithmetic total of all of the previous numbers in the column?

A. That's right, it is.

Q. Is that number transferred without modification to Table 5 of the appropriate Dornbusch exhibit that corresponds to the same discount rate as systems costs in dollars?

A. Yes, it is.

Q. The arithmetic computation for net return from values to present, to present value of system costs gives the present benefit-cost ratio in the right-hand column?

A. That's correct, it does.

Q. How about that?

A. How about it.

Q. Dave, are the benefit-cost ratios shown on Table 5 of Exhibit 6, 16, 17 and 18, the ones that you plotted on the graph that you showed me yesterday, which is Exhibit 5?

A. Can you show me the exhibits to which you're referring?

Q. Sure.

A. There is the graph and there are your four sets of tables, and the question was did the benefit-cost ratios in Exhibit 5 --

Q. Right.

A. -- in each of these exhibits reflect the same points that are plotted on the graphs?

Q. Is that the same step to go from each step on Table 5 to plot them on Exhibit 5?

A. Right, that's the next step.

Q. And what was the next thing you did after plotting the benefit-cost curves on Dornbusch Exhibit 5?

A. I hoped that I wouldn't have to recalculate anything else. I considered that part of my work finished.

Q. So Deposition Exhibit 5 is sort of a sum product, as it were?

A. That's right.

Q. A final result?

A. Right.

Q. Dave, in doing this analysis or any other economic work for this case, have you consulted with any documents other than those described in Dornbusch Exhibits 2 and 4? I could show you those if you need to see them.

A. There might be some references which I mentioned today which are not included, and I'm not sure if they are included or not.

Q. Okay, let me rephrase the question.

A. Sure.

Q. Other than the specific references you made during yesterday and today --

A. Yes.

Q. -- are there any other sources of information on which you relied, not just for your B-C analysis, but any other part of your work for this case which are not shown on Dornbusch Exhibits 2 and 4?

A. Relied on a document for numbers or just used for background information?

Q. Yes, relied on in the sense for either hard data or approaches or background investigation, whatever.

A. Okay, as far as I can recall and to the best of my ability to put together whatever other references that there might have been, I believe that they are included here, and some of them you might have seen already. I wasn't sure whether those additional references had been included as a part of --

Q. Okay, I think the additional references, let me check, were marked in San Francisco as Dornbusch Exhibit 4.

A. Okay. Well, that sheet is redundant.

Q. Okay.

A. But the others, I don't know whether they were included and how it referenced the second one --

Q. Uh-huh.

A. The one that you're looking at now is the one that I referred to earlier which I was not sure of the title. That's the proper title.

MR. MERRILL: Okay. Off the record for a moment.

(Off-the-record discussion.

(The instrument hereinafter described was identified as Dornbusch Deposition Exhibit No. 24.

Q (By Mr. Merrill) Dave, if you were to perform an economic analysis of the feasibility of expanding the current levels of irrigation within the federal irrigation projects, would your analysis follow the same course as the one that we have discussed for the last couple of days about the future lands?

A. I don't know. I haven't considered it.

Q. Do you feel that you would be qualified to perform such an analysis?

A. I don't see why not.

Q. Okay, would you be performed -- excuse me, would you be qualified to perform an analysis of the feasibility of expanding irrigation within lands under permit?

A. I would assume so.

Q. Okay.

A. But I think those questions are best left to whoever is going to determine whether I'm to perform those, if I am to perform those.

Q. Well, I'm just wondering if in your own opinion you are qualified to do that type of analysis.

A. Yes, I think so.

Q. Okay, have you performed a feasibility study of any other irrigation project than the one we are discussing or any modification or version of the project other than the one we have been discussing?

A. On the Wind River Reservation?

Q. Yes.

A. No.

Q. Have you developed for this project -- Have you developed any information in the form of marginal cost vs. marginal return information as a function of land irrigated?

A. I haven't.

Q. Okay. So, to sum up this portion of the work, you took a proposed irrigation system, figured out what the returns would be and what the costs would be and worked it all back to the present value - I'm aggregating essentially stuff we've been talking about the last two days - and then determined whether the benefits exceeded the costs at given discount rates?

A. Well, I think what I would prefer to do is let all of the testimony that I have given you for the last two days stand for what I have done rather than summarize it.

Q. Okay. All right, what other work have you done

with respect to the Indian claims portion of this litigation besides the feasibility study that we've been talking about?

A. Oh, I have done some other work in connection with municipal, livestock and mineral, industrial, but that work was all described in my earlier deposition.

Q. You haven't done any work on those portions of the project since your earlier deposition?

A. Oh, I have done some incidental work in terms of discussing matters with Jim Merchant, but I have not performed any analyses.

Q. Now that we have them back, I'll hand you the pages that have been marked for identification as Dornbusch Exhibit 24. Would you identify those, please?

A. Yes, these are copies of pages of four references which I have referred to in the course of my work which I had those references.

Q. Okay, other than the work you have described already as part of your feasibility study, did you do any analysis of the early years of this project's operation to account for perhaps extraordinary costs in the early years or yield difference than those that you have projected throughout most of the life of the project?

A. Which projects, early operation?
Q. Any of the five future lands projects.
A. I don't understand your question.
Q. You told me earlier in your deposition that for crops, for example, you assumed certain yields as part of your benefit-cost study.
A. I estimated a yield, yes.
Q. Okay, did you use your yield estimate from the very first year of production through the 100th year of production or --
A. Yes, I did.
Q. Okay, you didn't assume any different yield for a Year 1 because it is the first year you're growing a crop on the soil?
A. I did not.
Q. Okay, did you assume any changes in the costs that we've been discussing for the first few years of the project?
A. No, I did not.
Q. Okay. So the costs and the projected yields are the same throughout the 100-year life of the project for purposes of your feasibility analysis?
A. I did -- That's right.
Q. Okay, have you consulted with Dr. Cummings or Dr. Lansford, the economists retained by the

Tribes for this case?

A. I have not consulted with them; I have met with them, I have listened to their depositions.

Q. How many times have you met with them?

A. Oh, I believe I have attended one meeting with Dr. Lansford prior to his deposition; I attended his deposition. I attended Dr. Cummings deposition, and I attended one brief meeting following their depositions with both gentlemen.

Q. Did you discuss with them the work that you've been doing for this case?

A. Only in very general terms. I don't think we got into specifics.

Q. What has been the general substance of your discussions with them?

A. I think they asked me some of the same kind of questions that you did about what crops I had used and how I had made my calculations, and I explained to them.

Q. Did they discuss with you the appropriateness of certain items to be included as costs?

A. No, they mentioned that they might do it differently, but we didn't get into very great detail.

Q. Did you change any portion of your feasibility analysis as a result of any of your discussions

or meetings with them?

A. No, none at all.

Q. Has the feasibility analysis that we've been discussing -- Strike that.

Are there any costs that you have considered as part of your feasibility analysis for the five project areas which we have not discussed as part of your deposition?

A. Can you be more specific? What is it you're referring to?

Q. Well, as I understand the feasibility analysis or benefit-cost analysis essentially looks or compares two scenarios. One scenario is that you do nothing, the second scenario is that you do something.

A. Uh-huh.

Q. And you look at the do something scenario and you look at all of the costs that will be incurred as a result of doing something.

A. Uh-huh.

Q. You look at all the benefits that will accrue and you take those and, if necessary and they are strung out over a period of time, you bring them all back to a present value.

A. Uh-huh.

Q. I want to know if during your deposition over the

last several days we have discussed all of the costs that you have evaluated in arriving at the benefit-cost ratios shown on Dornbusch Exhibit 5, or are there some costs sitting out there that we haven't gotten to yet?

A. All of the costs that are appropriate to be included in the cost section of my analysis are included. So, to answer your question, yes, they -- the appropriate costs have been included.

Q. Okay, my question went to whether or not we have discussed all of the costs that were included.

A. Yes, we have discussed all of the costs --

Q. Okay.

A. -- which have been included.

Q. Okay. Now, with respect to the benefits --

A. Yes.

Q. -- the same question. Have we discussed all of the benefits that you have included in your analysis?

A. We have.

Q. Okay. And does your analysis include all of the benefits that are appropriate to consider that should be considered as part of this type of analysis?

A. Well, I have performed the analysis that in my judgment is appropriate. And if you're asking if

I have explained or if we have discussed all of the benefits and costs which I feel are appropriate, the answer is, yes, we have discussed them.

Q. Okay, the subject of my last question went to ensuring that in your mind your analysis includes all of the benefits which ought to be considered.

A. Well, ought to be by --

Q. By you.

A. In whose judgment?

Q. By your judgment, you're the professional.

A. Well, okay, I'm trying to answer your question, but the problem that I have is that there is no hard and fast rule about what is the proper analysis to determine what extent of acreage in these project areas or anywhere in the Wind River Reservation should be irrigated or could be irrigated to determine a water rights claim. I have made an analysis that I feel represents the benefits and costs which ought to be considered at a minimum; that if you do an analysis of feasibility, this is at least where you begin. Beyond that, I have not made judgments, but I would not necessarily foreclose the fact that some other benefits and perhaps some other costs might be considered in order to determine practicably irrigable in the

determination of the water rights claim.

Q. Okay, as used in the phrase "practicably irrigated acreage" --

A. Yes.

Q. -- what does the word "practicably" mean to you?

A. I don't think I want to get into a discussion about that.

Q. I imagine you don't.

A. I don't think that's for me to define, I think that's for others to define.

Q. Do you think that the word connotes some degree of economic feasibility?

A. Yes.

Q. Is the benefit-cost ratio one method of evaluating economic feasibility?

A. Yes.

Q. Are there other methods?

A. No, benefit-cost ratio is a good tool for evaluating economic feasibility.

Q. Are there other tools that are used to evaluate feasibility?

A. Yes, there are other ways of comparing costs and revenues, benefit-cost ratio is one.

MR. MERRILL: Okay. Have you got any maps yet?

MR. SOMMERS: No, they are not done.

Q. (By Mr. Merrill) In your professional judgment, should further economic studies of the proposal we've been talking about, the irrigation project or five projects, however you want to look at it, should further economic studies of those projects be made before funds are actually allocated for their design and construction?

A. It depends on the criteria you want to use in order to determine whether you want to spend funds and who is spending the funds.

Q. On Page 2 of Dornbusch Exhibit 24 you include a page out of what appears to be a United States Bureau of Reclamation Handbook.

A. Yes.

Q. And you have included a page concerning "Economic Justification". Are you familiar with the standards that the Bureau of Reclamation requires for economic justification before committing public funds, federal funds to construct irrigation projects?

A. Well, I have reviewed them in the past and I considered them and I'm not sure that I could answer specific questions about them if this is an oral quiz on what they say.

Q. No, no, this is not an oral quiz at all. Are you generally familiar with --

A. I am generally familiar.

Q. -- with the level of intensity that they require?

A. Yes.

Q. How does the study that you performed of the five new projects compare with respect to level of intensity to the level of requirements in the Bureau of Reclamation procedures for committing public funds to build irrigation projects?

A. Oh, I think it is probably a lot more intense. I think our analysis is more intense than might be required under a Bureau of Rec project.

Q. So if we were to apply the Bureau criteria for intensity, although the time standard might be different, if we were to apply the Bureau criteria to intensity of the study you have described to me in the last couple of days, it would meet the Bureau standards for how closely you have looked at this project?

A. Well, it is hard to -- to discuss intensity because each item of analysis has a level of intensity and what you mean by intensity is open to discussion. I think what I would say is that the basic principles that the Bureau of Reclamation suggests in

these guidelines have been followed in our analysis.

Q. When you say "followed", you followed the Bureau guidelines, do you mean that your study has been as detailed as one that they would require before committing public funds?

A. Well, I can't speak for the Bureau. I believe it is a study that would be adequate for evaluation of a Bureau of Reclamation project, but with the restriction that this is not designed, this analysis was not designed for that purpose.

Q. I understand.

A. And that the objectives are different and that the differing objectives might have indicated to me that some portions of an analysis that the Bureau of Reclamation might request to be included might not be appropriate here.

Q. Okay.

A. And I might have omitted those.

Q. How would you characterize the main objective of the study you did?

A. To evaluate whether it is feasible to develop irrigated agricultural projects on the Wind River Reservation.

Q. In your professional judgment, is that the most appropriate type of economic analysis to be used

in a quantification of a reserved water right?

A. Is what the most appropriate?

Q. The type of analysis that you have performed for the Wind River Indian Reservation.

A. Yes, the type of analysis which we performed is, in my opinion, the most appropriate and that type of analysis is simply an economic analysis.

Q. If the benefits of a proposed project do not equal or exceed the costs --

A. Uh-huh.

Q. -- is that project economically unfeasible in your opinion?

A. Not necessarily. It depends on your definition of feasibility.

Q. Okay, what is your definition of feasibility?

A. It depends on the context that it is.

Q. Okay, let's take it for the context of this case.

A. In my opinion, the benefits should be greater than the costs to show feasibility.

Q. In this case?

A. In this case.

Q. Okay. Now, was your omission of the word "equal" or --

A. Equal to or greater than, thank you.

Q. Was that deliberate?

A. No, it was an accident.
Q. Okay. So if the benefits equal to or exceed the costs --
A. Yes.
Q. -- the benefits should equal or exceed the costs?
A. Yes.
Q. In this case?
A. Yes.
Q. Is that your opinion?
A. Then the project is clearly feasible.
Q. Okay, is clearly feasible?
A. Yes.
Q. And what would be your opinion of the economic feasibility of a project in which the benefits do not equal or exceed the costs?
A. In my opinion, it would not meet my definition of economic feasibility and -- Strike the "and". End of sentence.

MR. MERRILL: You're starting to sound like us.

Q. (By Mr. Merrill) As I understand it, Dornbusch Exhibit 5, which is the Benefit-Cost Curves, reflects your professional opinions concerning the economic feasibility at varying discount rates of the five projects proposed for future lands on the Wind River Indian Reservation, is that correct?

A. That's correct.
Q. Okay, how certain are your professional opinions which are represented in Dornbusch Exhibit 5?
A. How certain?
Q. Yes.
A. Do you mean how long is a piece of string?
Q. No.
A. I don't understand your question. How do you want to measure certainty?
Q. Well, you can use a confidence coefficient if you would like.
A. I couldn't do that.
Q. I take it that if you had five years to evaluate in more detail the scope and the cost and the benefits of the project, you would be more certain of your results than if you have two weeks to do it, is that generally true?
A. Probably, yes.
Q. Okay. And as you get to some point far enough out there in time, it doesn't matter how many more years you're going to spend because you're not going to be any more certain than you are or for each additional year of analysis you don't gain much more certainty?
A. You gain some, but not much more.

Q. Right. But back in the early part of the graph for each additional day you gain a fair amount?

A. Okay.

Q. What I'm wondering is where you are on that graph, if you can tell me even nonquantitatively, but in your own words --

A. I am willing to state that in my professional opinion all five project areas, that is the development of all five project areas are feasible.

Q. Okay.

MR. MERRILL: Let's go off the record for a moment.

(Off-the-record discussion.

(Recess, 2:50 p.m. to 3:05 p.m.

MR. MERRILL: Let's go back on the record and get this guy out of here.

Q. (By Mr. Merrill) Dave, what is your opinion concerning the appropriateness of the Water Resources Council guidelines in evaluating the feasibility of this irrigation project for these five projects?

A. The Water Resources Council guidelines?

Q. Yes.

A. It is my opinion that those are appropriate to use.

Q. Do you have any qualifications of that opinion, across the board they are appropriate guidelines

for use in the kind of analysis that you perform?

A. Yes, I think that the principles that they suggest are the correct ones to use.

Q. How about the methods that they suggest?

A. Well, that's -- I think the general principles that they suggest are the correct principles to use and the methods that you must use in order to adhere to those principles are the correct ones, those are the ones that I have used.

Q. Okay, so you would regard the WRC guidelines as authoritative in doing this kind of analysis?

A. Yes, I would.

Q. Okay, did you perform the feasibility analysis for the five projects for any periods of time other than 100-year?

A. No.

Q. As part of your analysis did you consider other sizes or combinations of projects that might have greater economic feasibility than the five that we have discussed?

A. The only other analyses that I performed for areas other than these five project areas were not completed analyses, so I did not complete any feasibility analyses on any areas except for these.

Q. I take it you did at least start feasibility

analyses in other areas?

A. We made some preliminary calculations for one other area, as I recall, and that's all.

Q. What area was that?

A. That was a section of Big Horn Flats.

Q. Did you perform any analysis of additional irrigated agricultural in the Owl Creek drainage?

A. I can't be specific as to those types of locations. The only locations that I can refer to are by those types of names and the locations with respect to the drainage areas you would have to ask the engineers.

Q. Okay, are you familiar with the area called Arapahoe Ranch, just generally where it is located?

A. Somewhat, yes.

Q. Okay, did you do a feasibility analysis of irrigation in the Arapahoe Ranch area?

A. Not that I can recall, I did none.

Q. Okay, why did you abandon your analysis of the feasibility of this section in the Big Horn Flats you were telling me about?

A. My preliminary calculations showed that the costs were too great to show justification there.

Q. It just wasn't worth pursuing?

A. That's right.

Q. Okay, I direct your attention back to Dornbusch Exhibit 5. If we assume for the moment that 7 1/8 percent is the appropriate discount rate, and I recognize that this may be an arguable point, but for purposes of this question I ask you to assume that 7 1/8 percent is determined to be the appropriate discount rate for evaluating economic feasibility. If that's the case, is the Big Horn Flats project economically feasible according to your analysis?

A. Well, you understand that in my opinion that is not the appropriate rate, that the appropriate rate --

Q. Yes.

A. -- is considerably lower.

Q. Yes, I understand that to be your opinion.

A. Simply by my previous statement that if a project's benefit-cost ratio is less than one by my description of feasibility, it is not feasible.

Q. Okay.

A. So I think it would follow from that -- I don't understand what additional information you're seeking here.

Q. I'm not seeking any. I'm wondering if 7 1/8 percent is determined to be or assumed for purposes

of this question, assumed to be an appropriate discount rate, the correct, assuming there is one, discount rate to use, I'm asking you if, according to your analysis, the Big Horn Flats project is economically feasible. And I recognize you don't agree with that assumpion in the question.

A. Well, and according to the standards that I used in determining economic feasibility.

Q. Right.

A. Yes, I would agree that that's the case.

Q. That it is not feasible?

A. That's right.

Q. Okay, likewise, with the South Crowheart area at 7 1/8 percent discount rate?

A. That's correct.

Q. Okay, likewise, Big Horn Flats at a 6 percent discount rate?

A. That's correct.

Q. Okay, as part of your economic feasibility study did you consider the construction of any large water development structures either on or upstream of the Wind River Indian Reservation?

A. I did not consider the development of any such structures;that was all part of the engineer's analysis.

Q. Okay, at any time as a part of your feasibility analysis did you make an attempt to maximize net economic benefits to the Tribes of the Wind River Indian Reservation?

A. Maximize economic benefits?

Q. Uh-huh.

A. No, that was not a specific objective. My objective was to show feasibility, not to --

Q. So it wasn't part of your work to try to --

A. Do you mean maximize the benefit-cost ratio?

Q. No, to maximize the total benefits to --

A. Maximize the total benefits?

Q. Right, to the Indian Tribes.

A. I think the calculation that we used is an approximate maximization of benefits.

Q. What do you mean by that?

A. Well, it did not follow a rigorous method for seeking to maximize the benefits, but the essential philosophy of our approach was to do just that.

Q. Was to maximize benefits to the Tribes?

A. Was to seek the maximum benefits, yes.

Q. And how are they to be measured in your approach?

A. Well, I was trying to follow whatever notion you had, I assumed you were talking about economic benefits.

Q. Uh-huh, I was.

A. In dollar terms that's how they are measured.

Q. Is it your opinion that the five projects that we've been discussing for the past couple of days are those out of all possible projects the projects that would maximize --

A. I cannot state that. I don't know for sure because I did not test against a maximization.

Q. Okay. Then what's the basis for your statement that these projects approximate the maximum?

A. Oh, we followed a procedure to include in those sections of the project area where the benefits exceeded the costs. And by following that procedure, you of necessity come to an approach to maximization.

Q. As a part of your analysis did you evaluate the feasibility of some other alternative to see if that alternative might provide more net economic benefits to the Tribes?

A. Yes, that was in effect what we did because we did include areas which showed positive returns and excluded areas which did not. And by going through a procedure which does that, as I said, it seeks towards a maximization.

Q. Okay, other than that process that you have just

described of deleting and including certain areas, was your study designed in any other way to maximize economic benefits to the Tribes?

A. Not other than the methods that were used and which I described to you the last two days.

Q. Okay, did you evaluate individually any subunits within the five project areas or did you look at each project?

A. In effect, we did.

Q. As a whole project?

A. In effect, we did, yes.

Q. How so?

A. The sections of a project area are served by large sections of water supply development and those developments comprise components by which we analyzed those project areas.

Q. So if you had a marginally productive area in terms of benefits and costs, you would throw it out of your analysis?

A. If it was marginally positive, we would include it.

Q. Okay, if it was marginally negative?

A. We would exclude it.

Q. Okay, did you do anything along the lines of developing marginal costs and marginal return curves as a function of the quantity of water in order to see

how far out with the marginal cost you could go before marginal cost exceeded returns?

A. I did not.

Q. Did you do any other type analogous to that?

A. Yes, I just described --

Q. That was on the fashion of including and excluding parcels of land within the project?

A. Yes, large sections of the project.

Q. Dave, have you participated in helping counsel for the United States prepare any Answers to Interrogatories posed by the State of Wyoming other than the one set, I believe it was the seventh set, in which you listed a bibliography of sources and supplied a description of your firm and resumés of your people?

A. I responded to all questions posed to me by the Justice Department's attorneys. I can't recall specifically which were in connection with interrogatories. I can't recall.

Q. Okay.

A. Whatever interrogatories I was requested to respond to, I responded to.

MR. MERRILL: That's the safest answer I have heard.

THE WITNESS: Good.

MR. MERRILL: Let's see what else.

Q. (By Mr. Merrill) Oh, the only last thing I have is the maps of the project layouts that you gave to me in response to my query about how you determined the fence mileage.

A. Yes.

Q. For each of the project areas.

Can Jim Merchant of your office testify of his own personal knowledge that those maps were used to develop the fence mileage?

A. I believe he can.

MR. MERRILL: Is that correct?

MR. MERCHANT: What's the question again?

MR. ROGERS: Can you testify as to the fence mileage?

MR. MERCHANT: Yes.

MR. MERRILL: That was based on those --

THE WITNESS: Yes, it was based on those maps.

MR. MERRILL: Okay.

MS. SLEATER: Those specific identical maps?

MR. MERRILL: In that case, I have no further questions.

(Deposition concluded at (approximately 3:30 p.m.

REPORTER'S CERTIFICATE

State of Wyoming)
: SS
County of Laramie)

I, Lamont Miller, Registered Professional Reporter and Notary Public in and for the First Judicial District, State of Wyoming, hereby certify that there came before me at the hour of 8:15 a.m., Monday, January 12, 1981, and 8:15 a.m., Tuesday, January 13, 1981, at the Conference Room, State Engineer's Office, Barrett Building, Cheyenne, Laramie County, Wyoming, DAVID DORNBUSCH, who was by me duly sworn according to law to give testimony relative to the above-captioned cause; that said testimony and proceedings were reported in stenotype by me; that the foregoing pages, numbered 1-303, inclusive, constitute a true, correct and complete transcript of my stenographic notes as reduced to typewritten form under my direction.

I further certify that I am not agent, attorney or counsel for any of rhe parties hereto, nor am I interested in the outcome thereof.

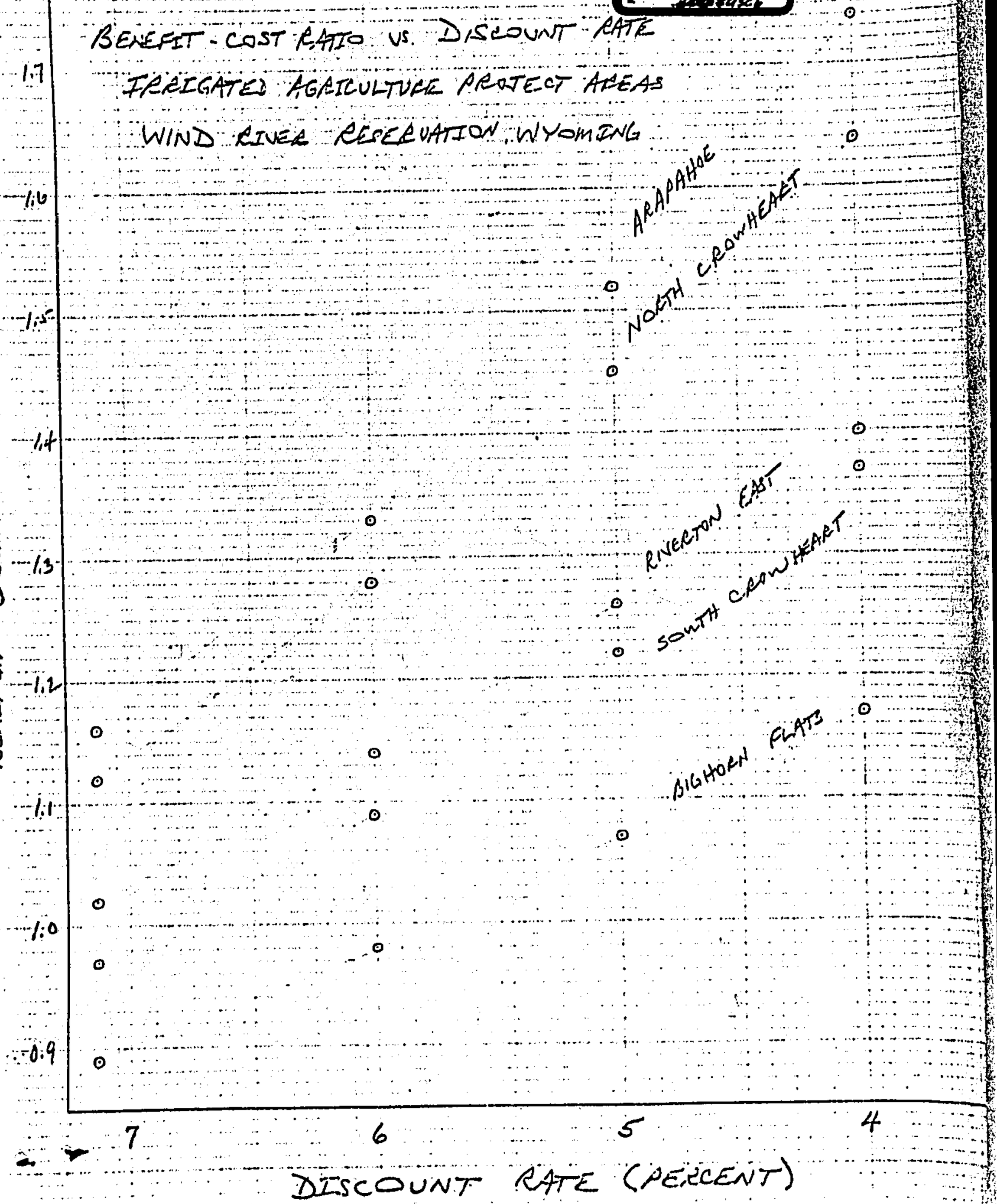
Dated this 19th day of January, 1981.

Lamont Miller - Notary Public
COUNTY OF LARAMIE STATE OF WYOMING
My Commission Expires March 29, 1983

LAMONT MILLER
Registered Professional
Reporter

DEPOSITION EXHIBIT 5

BENEFIT - COST RATIO VS. DISCOUNT RATE
IRRIGATED AGRICULTURE PROJECT AREAS
WIND RIVER RESERVATION, WYOMING



DEPOSITION EXHIBIT 6 Patterson

TABLE 1

CROPS, YIELDS, PRICES, AND GROSS RETURNS
WIND RIVER RESERVATION, WYOMING
(Prices and Returns in Dollars)

Crop	Units	Annual Yield Per Acre		Price Per Unit	Annual Gross Returns Per Acre	
		Lowland	Highland		Lowland	Highland
Malt Barley	Bushels	100	90	2.71	271.00	243.90
Baled Straw	Tons	.75	.75	35.33	26.50	26.50
Total					297.50	270.40
Nurse Barley	Bushels	88	79	2.71	238.48	214.09
Baled Straw	Tons	.75	.75	35.33	26.50	26.50
Total					264.98	240.59
Alfalfa	Tons	4.5	4.1	52.99	238.46	217.26
Aftermath	AUM*	1.5	1.5	5.48	8.22	8.22
Total					246.68	225.48
Corn Silage	Tons	20	—	15.90	318.00	—
Corn Grain	Bushels	89	—	2.55	226.95	—
Aftermath	AUM	1.6	—	~~10.00~~ 5.48	8.77	—
Total					235.72	—

*Animal-Unit Month

TABLE 2

GROSS RETURNS, PRODUCTION COSTS, AND NET RETURNS, BY CROP
WIND RIVER RESERVATION, WYOMING
(Annual Dollars Per Acre)

Crop	Gross Returns		Production Costs	Net Returns	
	Lowland	Highland		Lowland	Highland
Malt Barley	297.50	270.40	151.99	145.51	118.41
Nurse Barley	264.98	240.59	155.31	109.67	85.28
Alfalfa	246.68	225.48	84.27	162.41	141.21
Corn Silage	318.00	—	182.09	135.91	—
Corn Grain	235.72	—	158.56	77.16	—

TABLE 3

CROPPING PATTERN, AND WEIGHTED AVERAGE ANNUAL NET RETURNS, PER ACRE WIND RIVER RESERVATION, WYOMING

Crop	Lowland		Highland	
	Percent Distribution	Net Return	Percent Distribution	Net Return
Malting Barley	5	$145.51	17	$ 118.41
Nurse Malt Barley	16	109.67	16	85.28
Alfalfa	67	162.44	67	141.21
Corn Silage	3	135.91	—	—
Corn Grain	9	77.16	—	—
Weighted Average Net Returns		$144.66		$128.39

TABLE 4

NET BENEFITS OF IRRIGATED AGRICULTURE BY PROJECT AREA, PER ACRE
WIND RIVER RESERVATION, WYOMING

Project Area	Percent Lowland	Percent Highland	Average Annual Net Return	Annual On-Farm Irrigation O & M Cost	Project Area Net Benefit Per Acre	
					Annual	Present Value
North Crowheart	81.6%	18.4%	141.67	4.84	136.83	1987
South Crowheart	100%	—	144.66	5.65	139.01	2018
Bighorn Flats	91.4%	8.6%	143.26	5.06	138.20	2007
Riverton East	100%	—	144.66	5.72	138.94	2017
Arapahoe	100%	—	144.66	5.27	139.39	2024

TABLE 5

COMPARISON OF ECONOMIC COSTS AND BENEFITS FOR IRRIGATED AGRICULTURE BY PROJECT AREA
WIND RIVER RESERVATION, WYOMING

Project Area	Net Returns* (Dollars)	System Costs* (Dollars)	Benefit-Cost Ratio
North Crowheart	1987	1778	1.12
South Crowheart	2018	2080	.97
Bighorn Flats	2007	2251	.89
Riverton East	2017	1985	1.02
Arapahoe	2024	1743	1.16

*Net Returns and System Costs are expressed in terms of Present Value Per Acre

COST OF PRODUCING ALFALFA (BALED)* WIND RIVER RESERVATION, WYOMING (September, 1979 Normalized Prices) 4.5Tons/Acre

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Grow	Spread Fertilizer	80/custom	0-100-0	.143	.286	.64	.43			19.11	.20	20.38
	Roller Harrow	80/15'		.222	.222	1.00	.80	.57	.38		.16	2.91
	Spray for Weevil	Air								3.86		3.86
	Pickup (season)	½ton		20 mi.	.667	3.20	2.35				.47	6.02
					.444	2.49	3.73				.31	6.53
Harvest	Swath 2x	14' SP			1.000	4.50	3.30	2.06	2.33	6.91	.70	19.80
	Bale 2x	80/14x18	twine @ $1.536/ton	1.000								
	Stack Bales 2x	125/3 ton		.666	.666	3.48	2.72	2.38	2.28		.46	11.32
Subtotal						15.31	13.33	5.01	4.99	29.88	2.30	70.82
General Overhead	Miscellaneous					.77	.67	.25	.25	1.49	.57	4.00
	Interest						.13		.01	.82	.03	.99
Subtotal						16.08	14.13	5.26	5.25	32.19	2.90	75.81
Management												1.70
Land and Improvements												6.76
Total												84.27

*Not including on-farm irrigation.

COST OF PRODUCING MALTING BARLEY SEEDED TO ALFALFA WIND RIVER RESERVATION, WYOMING (September, 1979 Normalized Prices) 88Bu./Acre

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	2.37	2.14	2.16	1.39		.32	8.38
	Roller Harrow 2x	80/15'		.444	.444	2.00	1.60	1.13	.75		.31	5.79
	Level	125/12'		.250	.250	1.31	1.18	.45	.43		.17	3.54
	Spread Fertilizer	80/custom	96-54-0	.143	.286	.64	.43			32,29	.20	33.56
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.09	.21				.05	.35
	Plant	30/12'	90 lb. barl. 14 lb. alf.	.250	.250	.45	.79	1.48	.96	25.40	.17	29.25
Grow	Corrugate	80/6 row		.200	.200	.90	.60	.19	.46		.14	2.29
	Pickup (season)	½ ton		15 mi.	.500	2.40	1.76				.35	4.51
Harvest	Swath	14' SP			.250	1.40	2.10			15.02	.18	3.68
	Combine	custom	88 bu.									15.02
	Haul Barley	2 ton	60 mi./ 6.5T	19.6 mi.	1.270	2.94	7.07				.89	10.90
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.15	.24	.09	.13		.06	.67
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	1.13	.82	.51	.58	1.38	.17	4.59
	Stack Bales	125/3 ton	3/4 ton per acre	.150	.150	.78	.62	.54	.51		.11	2.56
Crop Insurance			$200 coverage							10.00		10.00
						16.56	19.56	6.55	5.21	84.09	3.12	135.09
Subtotal						.83	.98	.33	.26	4.20	.78	7.38
General Overhead	Miscellaneous						.31		.14	2.41	.06	2.92
	Interest					17.39	20.85	6.88	5.61	90.70	3.96	145.39
Subtotal												2.16
Management												6.76
Land and Improvements												155.31
Total												

COST OF PRODUCING
MALTING BARLEY
WIND RIVER RESERVATION, WYOMING
(September, 1979 Normalized Prices)
100Bu./Acre

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	2.37	2.14	2.16	1.39		.32	8.38
	Roller Harrow 2x	80/15'		.444	.444	2.00	1.60	1.13	.75		.31	5.79
	Level	125/12'		.250	.250	1.31	1.18	.45	.43		.18	3.55
	Spread fertilizer	80/custom	120-54-0	.143	.286	.64	.43			37.76	.20	39.03
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.09	.21				.05	.35
	Plant	30/12'	100 lb. @ 11¢	.250	.250	.45	.79	1.48	.96	11.00	.18	14.86
Grow	Corrugate	80/6 row		.200	.200	.90	.60	.19	.46		.14	2.29
	Spray Weeds	80/30'		.167	.167	.75	.51	.14	.23	1.54	.12	3.29
	Pickup (season)	½ ton		15 mi.	.500	2.40	1.76				.35	4.51
Harvest	Swath	14' SP			.250	1.40	2.10				.17	3.67
	Combine		100 bu.							16.24		16.24
	Haul Barley	2 ton	60 mi./ 6.5T	22 mi.	1.480	3.33	7.98				1.04	10.35
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.15	.24	.09	.13		.06	.67
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	1.13	.82	.52	.58	1.38	.17	4.60
	Stack Bales	125/3 ton	3/4 ton/ acre	.150	.150	.78	.62	.54	.51		.10	2.55
Crop Insurance			$200 coverage							10.00		10.00
Subtotal						17.70	20.98	6.70	5.44	77.92	3.39	132.13
General Overhead	Miscellaneous					.89	1.05	.33	.27	3.90	.84	7.28
	Interest						.33		.15	2.15	.07	2.70
Subtotal						18.59	22.36	7.03	5.86	83.97	4.30	142.11
Management												3.12
Land and Improvements												6.76
Total												151.99

COST OF PRODUCING
CORN FOR GRAIN
WIND RIVER RESERVATION, WYOMING
(September, 1979 Normalized Prices)
89Bu./Acre

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	1.16	1.05	.68	.53		.16	3.58
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.64	.43			43.68	.20	44.95
	Plow	125/4-16's		.454	.454	2.37	2.13	2.16	1.39		.32	8.37
	Roller Harrow 2x	80/15'		.444	.444	2.00	1.59	1.13	.75		.31	5.78
	Level 2x	125/12'		.500	.500	2.61	2.35	.89	.86		.35	7.06
	Spray Herbicide	custom								10.39		10.39
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.29	.95	1.41	.93	11.21	.20	15.99
Grow	Spray weeds	80/30'		.167	.167	.75	.51	.14	.23	2.05	.12	3.80
	Cultivate	80/6 row		.250	.250	1.13	.76	.24	.57		.17	2.87
	Pickup (season)	½ ton		24 mi.	.800	3.84	2.82				.56	7.22
Harvest	Combine	custom								14.21		14.21
	Haul Corn	2 ton	60 miles/ 6.5 tons	23.1 mi.	2.400	3.47	8.30				1.68	13.45
Subtotal						19.26	20.89	6.65	5.26	81.54	4.07	137.67
General Overhead	Miscellaneous					.96	1.04	.33	.26	4.08	1.02	7.69
	Interest						.45		.20	2.40	.09	3.14
Subtotal						20.22	22.38	6.98	5.72	88.02	5.18	148.50
Management												3.30
Land and Improvements												6.76
Total												158.56

CROPS & YIELDS.

DEPOSITION EXHIBIT 8 ROKUSICH

- 12-7-80 DMD

Alfalfa: 4.0 tons/acre (1 cut), rocks or would get higher

nurses with oats, leaves in for 7 years or more; 200 plusacres

Barley: 100 Bu/acre feed barley, 140 acres

NO CORN; thinks that growing season might be too short

Confirms and estimates for highland

referred me to

5/17 - 9/10 ; no forage split 6-1
plant - harvest ; Need soil temp 55°;
90 day corn - transplanted
50, 90, 100, 110 day corn

73-7- Corn: 20 Tons/acre 10 ft. tall - 40 acres
Barley up to 100 Bu/acre 1st/140 acres in the past - all 80 Bu. if more careful
Alfalfa - 5 tons (2 cuts) 180 acres - Now
12-7-80 Corn: Can't do grain" to alfalfa

alfalfa 5 tons/acre 2 (cuts) - 30 acres ; no rotation
grass hay 2.5-3 tons
call after 5 pm
2 neighbors - have a dog corn
12-8-80

has raised corn '68 - silage alfalfa 15-20 acres. 3 tons?
barley - feed 80 bu.

Garden corn - sweet corn in ~~the~~ brochure
rancher: Corn-standard

1,000 acres → Alf - 4.0-5.0 2 cuts w/out fert.; 300 acres; 6-7 yrs.; Barley for grs.
Malt Barley - 75 bu w/out fert - 100 Bu. w/ fert. Corn-Silage; could grow for grain
Nurse Malt Barley 70 bu. big kernals
area w/ yields like

Crops	Yield	Fert?	Acres	Location?
Malt B.	(80) tons	[illegible]	90	Some ground and alfalfa - All like this
Alf.	2-3 cut x 2 cuts		250	2 on W/ a
Nurse Malt B	(70)-100 Bu.			

- 10 yrs.

man

- all grown w/ hay ; all w/ grain - more cut. alf
Irrig. alf: 3- tons wet
Malt barley: 80 bu. - 70 bu. oats - could grow corn - silage 20 tons, grain
alf - 60 acres
oats needed for alf. hays?

Dave Man
Interview
Yields

FARMER | LOCATION | YIELDS (separate land segments) | ACREAGE

3-5 tons alfalfa
80-110 bu. grain
20-25 cwt. beans
18-23 tons silage
variation by land capabilities
Mostly, but some year-to-year

mixed alf-grain hay
2-3 tons without fertilizer

> 3½ tons alfalfa
(no fertilizer)

(usually water-short)
4 tons alfalfa

Growing season problems - frosts from glacier

4½-6 tons alfalfa
90-100 bu mixed barley 100-150 acres
18-20 cwt beans 90 acres
silage

16-30 cwt beans 150 acres
(20 avg)
7-100 bu mixed barley 150 "
3¾ tons alfalfa 20 acres (leased) competitive
6 tons " (own land) but leases don't want high yields

4-5 tons alfalfa 1/30 acres
Glacier drafts

X Dent 12-22-8=

corn for grain - didn't raise his corn for grain. Planted 80,90,100,110 day corn. All grew well. Certain he could have grown for grain, since more than 1/2 of the kernals were falling off the ears as he was chopping it for silage. 117 days growing season.

Barley was grown for feed. Obtained 100 bu./acre on some of his acreage and could have obtained 100 bu or more on all acreage if more careful about having soil analyzed and waiting for full maturity.

Farmer

Corn Silage - Letters

Corn Silage

DMJ 12-5-80

Movement costs [illegible] during season of

44 - 8 yrs. avg. 4 Tons/acre

Corn Silage 20 Tons

Grain 4 Tons

good operation

held.

small grains - oats 100 bu.

alfalfa 5 tons (2 cuts) - 50 acres

6-8 yrs. more oats, back into alfalfa

100 days season

N

goat hay

barley

alfalfa

12

Tyson Raise cereal + veg yields

12.24 SP

14%
7 1/8 %

DEPOSITION EXHIBIT 9 Dominick

COST OF PRODUCING ALFALFA (BALED)* WIND RIVER RESERVATION, WYOMING

(1980–Dollars)–

(September, 1979 Normalized Price)

4.5 Ton/Acre

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Grow	Spread Fertilizer	80/custom	0-100-0	.143	.286	.52	.43			19.11	.20	
	Roller Harrow	80/15'		.222	.222	.80	.80	.46	.38		.16	
	Spray for Weevil	Air								3.86		
	Pickup (season)	½ton		20 mi.	.667	2.60	2.35				.47	
Harvest	Swath 2x	14' SP			.444	1.94	3.73				.31	
	Bale 2x	80/14x18	twine @ $1.536/ton	1.000	1.000	3.62	3.30	1.70	2.33	6.91	.70	
	Stack Bales 2x	125/3 ton		.666	.666	7.70	2.72	1.97	2.28		.46	
Subtotal						12.18	13.33	4.13	4.99	29.88	2.30	
General Overhead	Miscellaneous					.61	.67	.21	.25	1.49	.57	
	Interest					—	13.07	—	.01	.82	.03	
Subtotal						12.79	14.07	4.34	5.25	31.83	2.89	71.17
Management												1.61
Land and Improvements												4.81
Total												77.59

*Not including on-farm irrigation.

COST OF PRODUCING MALTING BARLEY WIND RIVER RESERVATION, WYOMING (1980-Dollars)

(September 1979 Norwegian prices)

Tractor 100 Bu/Acre Truck or

	Operation	Tractor/ Implement	Material	Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	2.01	2.14	1.88	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.74	1.60	.99	.75		.31	
	Level	125/12'	120-54-0	.250	.250	1.11	1.18	.38	.43	37.76	.18	
	Spread fertilizer	80/custom	100-45-0	.143	.286	.56	.43			~~31.34~~	.20	
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.08	.21				.05	
	Plant	30/12'	100 lb. @ 11¢	.250	.250	.38	.79	1.27	.96	11.00	.18	
Grow	Corrugate	80/6 row		.200	.200	.78	.60	.16	.46		.14	
	Spray Weeds	80/30'		.167	.167	.65	.51	.12	.23	1.54	.12	
	Pickup (season)	½ ton		15 mi.	.500	2.10	1.76				.35	
Harvest	Swath	14' SP			.250	1.20	2.10				.17	
	Combine		100 ~~83~~ bu.	22.2	1.480		7.98			16.24 ~~14.53~~		
	Haul Barley	2 ton	60 mi./ 6.5T	~~18~~ mi.	~~1.200~~	2.89	~~6.47~~				~~.84~~	
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.13	.24	.08	.13		.06	
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	.98	.82	.46	.58	1.38	.17	
	Stack Bales	125/3 ton	3/4 ton/ acre	.150	.150	.66	.62	.48	.51		.10	
Crop Insurance			$200 coverage							10.00		
Subtotal						15.27	20.98	5.82	5.44	77.92 (16)	3.39	
General Overhead	Miscellaneous					.76	1.05	.29	.27	3.90	.84	
	Interest					—	.72	—	.14	~~1.51~~ (.21)	.08	
Subtotal						16.03	22.25	6.11	5.85	~~85.77~~ (17) 83.32	4.31	~~115.62~~ 137.88
Management												~~2.03~~ 3.02
Land and Improvements							-.31					5.41
Total												~~147.06~~ 146.31

COST OF PRODUCING
MALTING BARLEY SEEDED TO ALFALFA
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)
(September 1979 Normalized Prices)
58 Bu/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	2.01	2.14	1.88	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.74	1.60	.99	.75		.31	
	Level	125/12'		.250	.250	1.11	1.18	.38	.43	32.29	.17	
	Spread Fertilizer	80/custom	80-45-0	.143	.286	.56	.43			26.79	.20	
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.08	.21				.05	
	Plant	30/12'	90 lb. barl. 14 lb. alf.	.250	.250	.38	.79	1.27	.96	25.40	.17	
Grow	Corrugate	80/6 row		.200	.200	.78	.60	.16	.46		.14	
	Pickup (season)	½ ton		15 mi.	.500	2.10	1.76				.35	
Harvest	Swath	14' SP			.250	1.20	2.10			15.02	.18	
	Combine	custom	73 bu.	19.6	1.270		7.07			13.51	.89	
	Haul Barley	2 ton	60 mi./ 6.5T	16.2 mi.	1.050	2.55	5.84				.74	
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.13	.24	.08	.13		.06	
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	.98	.82	.46	.58	1.38	.17	
	Stack Bales	125/3 ton	3/4 ton per acre	.150	.150	.66	.62	.48	.51		.11	
Crop Insurance			$200 coverage							10.00		
Subtotal						14.28	19.56	5.70	5.21	84.09	3.12	
General Overhead	Miscellaneous					.71	.98	.19	.26	4.20	.78	
	Interest					–	.72	–	.10	1.69	.04	
Subtotal						14.99	20.76	5.99	5.57	89.98	3.94	141.23
Management												3.08
Land and Improvements												5.41
Total												149.72

COST OF PRODUCING CORN FOR SILAGE WIND RIVER RESERVATION, WYOMING (1980-Dollars)

(September, 1979 Normalized Prices)

20 Tons/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	.98	1.05	.57	.53	43.68	.16	
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.56	.43			32.30	.20	
	Plow	125/4-16's		.454	.454	2.01	2.13	1.88	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.74	1.54	.99	.75		.31	
	Level 2x	125/12'		.500	.500	2.22	2.35	.76	.86		.35	
	Spray Herbicide	custom								10.39		
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.12	.95	1.21	.93	11.21	.20	
Grow	Spray Weeds	80/30'		.167	.167	.65	.51	.12	.23	2.05	.11	
	Cultivate	80/6 row		.250	.250	.98	.76	.20	.57		.17	
	Pickup (season)	½ ton	24 mi.		.800	3.36	2.82				.56	
Harvest	Chop & Haul	custom	@ $2.03 per ton							40.60		
	Pack	125/blade		.800	.800	3.54	3.27	.83	.35		.56	
Subtotal						17.16	15.86	6.56	5.61	107.93 (.97)	2.94	
General Overhead	Miscellaneous					.86	.79	.33	.28	5.40	.74	
	Interest					—	.21	—	.11	1.63 (.19)	.014	
Subtotal						18.02	16.86	6.89	6.00	114.96 (.97)	3.72	166.45
Management												3.55
Land and Improvements												5.41
Total												175.41

COST OF PRODUCING
CORN FOR GRAIN
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)

(September 1979 Normalized Prices)

89 Bu/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor or Truck Fixed Costs	Tractor or Truck Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	.98	1.05	.57	.53	43.61	.16	
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.56	.43			32.30	.20	
	Plow	125/4-16's		.454	.454	2.01	2.13	1.88	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.74	1.59	.99	.75		.31	
	Level 2x	125/12'		.500	.500	2.22	2.35	.76	.86		.35	
	Spray Herbicide	custom								10.39		
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.12	.95	1.21	.93	11.21	.20	
Grow	Spray weeds	80/30'		.167	.167	.65	.51	.12	.23	2.05	.12	
	Cultivate	80/6 row		.250	.250	.98	.76	.20	.57		.17	
	Pickup (season)	½ ton		24 mi.	.800	3.36	2.82				.56	
Harvest	Combine	custom								14.21		
	Haul Corn	2 ton	60 miles/ 6.5 tons	23.1 mi.	2.400	3.00	8.30				1.68	
Subtotal						16.62	20.89	5.73	5.26	81.54	4.07	
General Overhead	Miscellaneous					.83	1.04	.29	.26	4.08	1.01	
	Interest					–	.52	–	.13	5.54	.10	
Subtotal						17.45	22.45	6.02	5.65	87.62	5.19	144.12 144.06
Management												3.22
Land and Improvements												5.11
Total												153.05 152.64

Try 11 Raise cereal + veg types

12-24-80

DEPOSITION EXHIBIT 10 DOMENICI

COST OF PRODUCING
ALFALFA (BALED)*
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)-
(September, 1979 Normalized Prices)
4.5 Ton/Acre

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Grow	Spread Fertilizer	80/custom	0-100-0	.143	.286	.56	.43			19.11	.20	
	Roller Harrow	80/15'		.222	.222	.87	.80	.50	.38		.16	
	Spray for Weevil	Air								3.86		
	Pickup (season)	½ton		20 mi.	.667	2.80	2.35				.47	
Harvest	Swath 2x	14' SP			.444	2.12	3.73				.31	
	Bale 2x	80/14x18	twine @ $1.536/ton	1.000	1.000	3.91	3.30	1.82	2.33	6.91	.70	
	Stack Bales 2x	125/3 ton		.666	.666	2.95	2.72	2.11	2.28		.46	
						13.21	13.33	4.43	4.99	29.88 (11.53)	2.30	
Subtotal						.66	.67	.12	.25	1.49	.57	
General Overhead	Miscellaneous					—	.13 (.01)	—	.01 (.01)	.82 (.31)	.03 (.02)	
	Interest											
Subtotal						13.87	14.09	4.65	5.25	31.94 (11.84)	2.89	72.69
Management												1.64
Land and Improvements												5.41
Total												19.74

*Not including on-farm irrigation.

COST OF PRODUCING MALTING BARLEY WIND RIVER RESERVATION, WYOMING (1980-Dollars)

September, 1979 Northwestern Wyoming (Irrigated)

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	1.84	2.14	1.74	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.61	1.60	.92	.75		.31	
	Level	125/12'	120-54-0	.250	.250	1.01	1.18	.35	.43	37.76	.18	
	Spread fertilizer	80/custom	100-45-0	.143	.286	.52	.43			~~31.34~~	.20	
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.07	.21				.05	
	Plant	30/12'	100 lb. @ 11¢	.250	.250	.34	.79	1.17	.96	11.00	.18	
Grow	Corrugate	80/6 row		.200	.200	.72	.60	.15	.46		.14	
	Spray Weeds	80/30'		.167	.167	.60	.51	.11	.23	1.54	.12	
	Pickup (season)	½ ton		15 mi.	.500	1.95	1.76				.35	
Harvest	Swath	14' SP			.250	1.10	2.10				.17	
	Combine		100 ~~83~~ bu.	22.2 ~~18~~ mi.	1.480 ~~1.200~~		7.92 ~~6.47~~			16.24 ~~14.63~~	~~.84~~	
	Haul Barley	2 ton	60 mi./ 6.5T			2.44						
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.11	.24	.07	.13		.06	
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	.91	.82	.43	.58	1.38	.17	
	Stack Bales	125/3 ton	3/4 ton/ acre	.150	.150	.61	.62	.44	.51		.10	
Crop Insurance			$200 coverage							10.00		
Subtotal						13.83	20.98	5.38	5.44	77.92	3.39	
General Overhead	Miscellaneous					.69	1.05	.27	.27	3.90	.84	
	Interest					—	.18	—	.98	1.21	.04	
Subtotal						14.52	22.21	5.65	5.79	83.03	4.27	135.47
Management												2.98
Land and Improvements												4.81
Total												143.76

COST OF PRODUCING
MALTING BARLEY SEEDED TO ALFALFA
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)

(September 1979 Normalized Prices)

68 Bu/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	1.84	2.14	1.74	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.61	1.60	.92	.75		.31	
	Level	125/12'	96-48-0	.250	.250	1.01	1.18	.35	.43	32.29	.17	
	Spread Fertilizer	80/custom	80-45-0	.143	.286	.52	.43			~~26.79~~	.20	
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.07	.21				.05	
	Plant	30/12'	90 lb. barl. 14 lb. alf.	.250	.250	.34	.79	1.17	.96	25.40	.17	
Grow	Corrugate	80/6 row		.200	.200	.72	.60	.15	.46		.14	
	Pickup (season)	½ ton		15 mi.	.500	1.95	1.76				.35	
Harvest	Swath	14' SP	68		.250	1.10	2.10			15.02	.18	
	Combine	custom	73 bu.	19.6	1.270		7.07			~~13.51~~	.89	
	Haul Barley	2 ton	60 mi./ 6.5T	~~16.2~~ mi.	~~1.050~~	2.16	~~5.84~~				~~.74~~	
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.11	.24	.07	.13		.06	
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	.91	.82	.43	.58	1.38	.17	
	Stack Bales	125/3 ton	3/4 ton per acre	.150	.150	.61	.62	.44	.51		.11	
Crop Insurance			$200 coverage							10.00		
Subtotal						12.95	19.56	5.27	5.21	84.09 (82.03)	3.12	
General Overhead	Miscellaneous					.65	.98	.26	.26	4.20	.15	
	Interest					—	.39	—	.10	~~1.68~~ (.31)	.06	
Subtotal						13.60	20.93	5.53	5.57	~~89.97~~ (86.54) 89.64	3.96	139.23
Management												3.04
Land and Improvements												4.81
Total												147.08

COST OF PRODUCING
CORN FOR SILAGE
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)

(September, 1979 Normalized Prices)

20 Ton/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	.90	1.05	.52	.53	43.68	.16	
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.52	.43			~~32.30~~	.20	
	Plow	125/4-16's		.454	.454	1.84	2.13	1.74	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.61	1.54	.92	.75		.31	
	Level 2x	125/12'		.500	.500	2.03	2.35	.70	.86		.35	
	Spray Herbicide	custom								10.39		
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.04	.95	1.11	.93	11.21	.20	
Grow	Spray Weeds	80/30'		.167	.167	.60	.51	.11	.23	2.05	.11	
	Cultivate	80/6 row		.250	.250	.91	.76	.19	.57		.17	
	Pickup (season)	½ ton		24 mi.	.800	3.12	2.82				.56	
Harvest	Chop & Haul	custom	@ $2.03 per ton							40.60		
	Pack	125/blade		.800	.800	3.24	3.27	.77	.35		.56	
Subtotal						15.81	15.86	6.06	5.61	107.93 (107)	2.94	
General Overhead	Miscellaneous					.79	.79	.30	.28	5.40	.74	
	Interest					—	~~.11~~ .32	—	.11	~~2.11~~ 2.16 (.27)	.06	
Subtotal						16.60	16.97	6.36	6.00	~~115.44~~ 114.68 (5.77)	3.74	~~165.16~~ 164.34
Management												~~3.54~~ 353
Land and Improvements												4.81
Total												~~173.51~~ 172.68

COST OF PRODUCING CORN FOR GRAIN WIND RIVER RESERVATION, WYOMING (1980-Dollars)

(September 1979 Normalized Prices)

89 Bu/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	.90	1.05	.52	.53	43.68	.16	
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.52	.43			32.30	.20	
	Plow	125/4-16's		.454	.454	1.84	2.13	1.74	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.61	1.59	.92	.75		.31	
	Level 2x	125/12'		.500	.500	2.03	2.35	.70	.86		.35	
	Spray Herbicide	custom								10.39		
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.04	.95	1.11	.93	11.21	.20	
Grow	Spray weeds	80/30'		.167	.167	.60	.51	.11	.23	2.05	.12	
	Cultivate	80/6 row		.250	.250	.91	.76	.19	.57		.17	
	Pickup (season)	½ ton		24 mi.	.800	3.12	2.82				.56	
										14.21		
Harvest	Combine	custom										
	Haul Corn	2 ton		60 miles/ 6.5 tons	23.1 mi. 2.400	2.54	8.30				1.68	
Subtotal						15.11	20.89	5.29	5.26	81.54	4.07	
General Overhead	Miscellaneous					.76	1.04	.26	.26	4.08	1.02	
	Interest					—	.17 .42	—	.07 .11	1.63	.08	
Subtotal						15.87	22.35	5.55	5.63	87.25	5.17	141.82 = 141.53
Management										8.97		3.17 3.16
Land and Improvements												4.81
Total												14.080 149.50

Typist: Raise pencil + verify

12-24-80

6 %
7 1/8 %

COST OF PRODUCING ALFALFA (BALED)* WIND RIVER RESERVATION, WYOMING

(1980-Dollars)-

(September, 1979 Normalized Prices)

4.5 Tons/Acre

DEPOSITION EXHIBIT 11 Dorr Busch

	Operation	Truck or Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Truck or Tractor Fixed Costs	Truck or Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Grow	Spread Fertilizer	80/custom	0-100-0	.143	.286	.60	.43			19.11	.20	
	Roller Harrow	80/15'		.222	.222	.93	.80	.53	.38		.16	
	Spray for Weevil	Air								3.86		
	Pickup (season)	½ton		20 mi.	.667	3.00	2.35				.47	
Harvest	Swath 2x	14' SP			.444	1.30	3.73				.31	
	Bale 2x	80/14x18	twine @ $1.536/ton	1.000	1.000	4.18	3.30	1.93	2.33	6.91	.70	
	Stack Bales 2x	125/3 ton		.666	.666	3.20	2.72	2.24	2.28		.46	
Subtotal						14.21	13.33	4.70	4.99	29.88	2.30	
General Overhead	Miscellaneous					.71	.67	.24	.25	1.49	.57	
	Interest					-	.13	-	.01	.82	.03	
Subtotal						14.92	14.10	4.94	5.25	32.06	3.89	74.16
Management												1.67
Land and Improvements												6.03
Total												81.86

*Not including on-farm irrigation.

COST OF PRODUCING MALTING BARLEY WIND RIVER RESERVATION, WYOMING (1980-Dollars)

(September 1979 Nat. analysis (Idaho) 100 Bu/Acre Truck or Tractor

	Operation	Tractor/ Implement	Material	Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	2.18	2.14	2.01	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.86	1.60	1.06	.75		.31	
	Level	125/12'	120-51-0	.250	.250	1.20	1.18	.41	.43	37.76	.18	
	Spread fertilizer	80/custom	100-45-0	.143	.286	.60	.43			~~31.34~~	.20	
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.08	.21				.05	
	Plant	30/12'	100 lb. @ 11¢	.250	.250	.42	.79	1.37	.96	11.00	.18	
Grow	Corrugate	80/6 row		.200	.200	.84	.60	.17	.46		.14	
	Spray Weeds	80/30'		.167	.167	.70	.51	.13	.23	1.54	.12	
	Pickup (season)	½ ton		15 mi.	.500	2.25	1.76				.35	
Harvest	Swath	14' SP			.250	1.29	2.10			16.24	.17	
	Combine		100 ~~83~~ bu.	12.2	1.480		7.98			~~14.63~~	~~.84~~	
	Haul Barley	2 ton	60 mi./ 6.5T	~~18~~ mi.	~~1.200~~	3.11	~~6.47~~					
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.14	.24	.08	.13		.06	
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	1.05	.82	.48	.58	1.38	.17	
	Stack Bales	125/3 ton	3/4 ton/ acre	.150	.150	.72	.62	.50	.51		.10	
Crop Insurance			$200 coverage							10.00		
Subtotal						16.44	20.98	6.21	5.44	77.92	3.39	
General Overhead	Miscellaneous					.82	1.05	.31	.27	3.90	.14	
	Interest						.26		.12	1.82	.06	
Subtotal						17.26	22.29	6.52	5.83	83.64	4.29	139.83
Management												3.07
Land and Improvements												6.03
Total												148.93

COST OF PRODUCING
MALTING BARLEY SEEDED TO ALFALFA
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)

(September 1979 Normalized Prices)

63 Bu/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Plow	125/4-16's		.454	.454	2.18	2.14	2.01	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.86	1.60	1.06	.75		.31	
	Level	125/12'		.250	.250	1.20	1.18	.41	.43	32.29	.17	
	Spread Fertilizer	80/custom	80-45-0	.143	.286	.60	.43			~~26.79~~	.20	
Plant	Haul Seed	2 ton	60 mi./ 100cwt	.6 mi.	.075	.08	.21				.05	
	Plant	30/12'	90 lb. barl. 14 lb. alf.	.250	.250	.42	.79	1.37	.96	25.40	.17	
Grow	Corrugate	80/6 row		.200	.200	.84	.60	.17	.46		.14	
	Pickup (season)	½ ton		15 mi.	.500	2.25	1.76				.35	
Harvest	Swath	14' SP			.250	1.29	2.10			15.02	.18	
	Combine	custom	~~73~~ bu.	19.6	1.270		7.07			~~13.51~~	.89	
	Haul Barley	2 ton	60 mi./ 6.5T	~~16.2~~ mi.	~~1.~~050	2.74	~~5.84~~				~~.74~~	
Post-Harvest	Rake Straw	30/8'	½ area	.083	.083	.11	.24	.08	.13		.06	
	Bale Straw	80/14x18	30 bales @ 50 lbs.	.250	.250	1.05	.82	.48	.58	1.38	.17	
	Stack Bales	125/3 ton	3/4 ton per acre	.150	.150	.72	.62	.50	.51		.11	
Crop Insurance			$200 coverage							10.00		
Subtotal						15.31	19.56	6.08	5.71	84.09	5.12	
						.77	.98	.30	.26	4.20	.78	
General Overhead	Miscellaneous					-		-				
	Interest						.59		.15	7.03	.49	
Subtotal						16.14	21.13	6.38	5.62	95.32	6.39	143.58
Management												3.11
Land and Improvements												6.03
Total												151.12

COST OF PRODUCING CORN FOR SILAGE WIND RIVER RESERVATION, WYOMING (1980-Dollars)

(September, 1979 Normalized Prices)

20 Ton/Acre

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor Fixed Costs	Tractor Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	1.07	1.05	.62	.53	43.68	.16	
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.60	.43			32.30	.20	
	Plow	125/4-16's		.454	.454	2.18	2.13	2.01	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.86	1.54	1.06	.75		.31	
	Level 2x	125/12'		.500	.500	2.40	2.35	.82	.86		.35	
	Spray Herbicide	custom								10.39		
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.20	.95	.30	.93	11.21	.20	
Grow	Spray Weeds	80/30'		.167	.167	.70	.51	.13	.23	2.05	.11	
	Cultivate	80/6 row		.250	.250	1.05	.76	.22	.57		.17	
	Pickup (season)	½ ton		24 mi.	.800	3.60	2.82				.56	
Harvest	Chop & Haul	custom	@ $2.03 per ton							40.60		
	Pack	125/blade		.800	.800	3.84	3.27	.90	.35		.56	
Subtotal						18.50	15.86	7.06	5.61	107.93 (102.93)	2.94	
General Overhead	Miscellaneous					.93	.79	.35	.28	5.40	.74	
	Interest					–	.26	–	.13	1.95 (1.85)	.05	
						19.43	16.91	7.41	6.02	115.28 (109.73)	3.73	168.78
Subtotal												3.61
Management												6.03
Land and Improvements												178.42
Total												

COST OF PRODUCING
CORN FOR GRAIN
WIND RIVER RESERVATION, WYOMING
(1980-Dollars)

(September 1979 Normalized Prices)

	Operation	Tractor/ Implement	Material	Tractor Hours or Truck Miles	Man-Hours	Tractor or Truck Fixed Costs	Tractor or Truck Variable Costs	Implement Fixed Costs	Implement Variable Costs	Materials & Custom	Labor	Total
Preplant	Disk	125/14'		.222	.222	1.07	1.05	.62	.53	43.68	.16	
	Spread Fertilizer	80/custom	150-50-0	.143	.286	.60	.43			32.30	.20	
	Plow	125/4-16's		.454	.454	2.18	2.13	2.01	1.39		.32	
	Roller Harrow 2x	80/15'		.444	.444	1.86	1.59	1.06	.75		.31	
	Level 2x	125/12'		.500	.500	2.40	2.35	.82	.86		.35	
	Spray Herbicide	custom								10.39		
Plant		80/6 row	19 lbs. @ $.59	.286	.286	1.20	.95	1.30	.93	11.21	.20	
Grow	Spray weeds	80/30'		.167	.167	.70	.51	.13	.23	2.05	.12	
	Cultivate	80/6 row		.250	.250	1.05	.76	.22	.57		.17	
	Pickup (season)	½ ton		24 mi.	.800	3.60	2.82				.56	
Harvest	Combine	custom								14.21		
	Haul Corn	2 ton		60 miles/ 6.5 tons	23.1 mi. 2.400	3.23	8.30				1.68	
Subtotal						17.89	20.89	6.16	5.26	81.54 (@.32)	4.07	
						.89	1.04	.31	.26	4.08	1.02	
General Overhead	Miscellaneous					–	.16	–	.11	1.96 (@.60)	.12	
	Interest											
Subtotal						18.78	22.19	6.47	5.63	87.58 (@.59)	5.21	145.86
Management												3.25
Land and Improvements												6.03
Total												155.14

Mach. or Implement	① Nom. Power	② Nom. S.V.	
Dozer ½	5430 5949	820 831	
2 ½ truck bH #1	11760 11,790	615 3079	
2 ½ truck #2	15375 15385	615	
125 hp	24375 24477	6675 6877	
80 hp	18640 19,710	3520 3542	
35 hp	9350 9378	670 665	
Plow	4140 4162	775 784	
F. H	3935 3954	985 989	
Cu	3105 3122	930 937	
Disk	3935 3954	1035 1041	
6. D.	3315 3330	910 916	
B. & C. Plant	2795 2810	830 835	
Cultiv	1695 1665	495 500	
Rotary	2070 2081	415	
Tool Cart	830 832	85	
MACH. SHOP	18000 18,077	6000 6026	
Dozer	5490 5515	930 937	
SHED	6000 6026	1000 1004	
Dozer IV	9320 9364	1220 1225	
S. Roller	1170 1175	205 208	
Bros Cart	1555	205	
Rod Mill	675	185	
Grader	18640 18750	4710 4741	
Sprayer	1345 1353	250 250	
Tire Changer	3005 3017	870	
Roller	825	207	

DEPOSITION EXHIBIT 13 Dorenbusch

Implement	New Price	Annual S.I.	Remaining useful years / useful life	Annualized Salvage value / useful life	Annual value	Total PV for "n" 1 to k	Total PV initial price + PV for 1 to k + PV of 11th yr sale
Pickup ½	6420 5949	670 621	4/6	3396 3375	3.47 3.44	6974 6874	12926 12,664
Tractor #1	11760 11,772	615 3079	10/18	7920 6056	8.12 6.86	3549 4546	15352 16,299
Tractor #2	14335 15,985	615 614	10/18	8656 8221	8.86 9.01	6012 5992 6664	21426 21336 21,330
12' Hyd	24335 24,477	6675 6677	2/14	9330 9393	9.34 9.63	10851 10783 10796	35348 35127 35,124
22' Hyd	19640 19,720	3570 3542	4/12	8510 8613	8.51 8.83	11833 11766 11775	30598 30468 30,467
28' Hyd	9320 9572	670 695	— 20	620 625	.62 0.64	2926 2936	12347 12,356
Planter	4140 4162	775 780	4/12	1907 1765	1.96 1.79	2650 2617 2621	6794 6759 6,759
Rotary Mower	3930 3934	985 989	— 10	989 705	1.01 .99	2988 2973 2976	6943 6909 6,911
Cultivator	3105 3132	930 937	4/12	1665 1648	1.71 1.69	1699 1672 1694	4823 4796 4,797
Disk	3935 3964	1025 1041	4/16	1769 1760	1.81 1.76	1449 1442 1444	5403 5378 5,378
Grain Drill	3345 3370	910 916	4/12	1721 1704	1.76 1.70	1878 1871 1873	5210 5167 5,166
Hay Conditioner	2795 2810	830 835	4/12	1492 1478	1.53 1.48	1538 1526 1530	4349 4325 4,324
Chisel	4695 4665	415 500	4/12	838 878	0.91 .88	906 902 903	3512 3556 2,556
Feeder	2070 2081	415	10/15	1524	1.52	914	2785 2,964
Trailer	830	85	10/15	584	.58	411 412	1242 1,242
10' SHOP	18000 18,018	6000 6000	12/30	14060 14,000	14.00 10.30	1747 1740	19754 19,835 0
Pickup	5490 5500	930 937	— 10	93 957	0.96	4613 4605 4660	10086 10,096
SHED	6000 6026	1000 1014	12/30	4333 4378	4.33 4.38 1.75	728 725	6729 6756 0
Pickup #2	9320 9370	1370 1388	— 10	1370 1388	1.37 1.38 1.36	8101 8142	8174 17824 17,491
Gravity Box	1140 1151	205 207	4/12	514 517	.51 0.53	729	1868 1,866
Grain Vac	1555	205	12/15	1110	1.11	745 747	2301 2,301
Post Hole Digger	675	185	4/12	347	.35	331 463	1054 1,077
Combine	18610 18,715	4710 4711	2/14	6702 6773	6.70 6.91	8635 8543	27230 27,227
Swather	13960	700	4/12	611	.61 0.63	859 852	2197 2,197
Tractor	3605	870	— 10	870	.87	2142 2144	5198 5,199
Rotary Hoe	675	185	4/12	347	.35	483 484	1311 1,312

1 of 1

DEPOSITION EXHIBIT 14 DORNBUSCH

{[① - ②] × ③} + ④ = ⑤ Normalized Value @ 100% yr

i = interest (enter previous page) on T.
PMT = ① - ④
N = k (previous pg corresponding to denom of ①)
PV = ?

① Date of Implement	② New Price	③ New S.V.	④ Remaining Useful Years @ 11th year / useful life	⑤ Normalized Value @ 100% yr value	⑥ Salvage present value	⑦ Total PV for "periods" 1 to k	⑧ ① + ⑤ + ⑤ Total PV initial price + PV for 11th + PV of ...
Dozer ½	~~5470~~ 5149	~~820~~ 831	4/8	~~3375~~ 3395	67	13,590	19,606
1 truck bkh #1	~~11760~~ 11,702	~~615~~ 3077	10/18	~~6856~~ 7920	157	8,250	20,202
~~1 truck #2~~	~~15335~~ 15335	~~615~~ 615	~~10/18~~	~~8656~~ 8321	175	—	—
125 hp	~~24735~~ 24487	~~6675~~ 6877	.143 2/14	~~9338~~ 7393	186	23,552	48,225
80 hp	~~18640~~ 19770	~~3520~~ 3542	4/12	~~8510~~ 8613	171	24,728	43,655
31 hp	9370 9578	670 625	— 20	~~620~~ 625	12	7,030	16,420
Plow	4140 4062	775 780	4/12	~~1785~~ 1907	38	5,497	9,697
R.H	3935 3934	985 989	— 10	~~905~~ 989	20	5,993	9,967
Cult	3105 3122	930 957	4/12	~~1648~~ 1665	33	3,551	6,706
Drill	3935 3934	1035 1041	4/16	~~1760~~ 1769	35	3,259	7,248
6. Rk	~~3345~~ 3330	910 916	4/12	~~1704~~ 1721	34	3,924	7,218
B. & C. Plant	2795 2810	830 835	4/12	~~1470~~ 1492	29	3,213	6,052
Cultiv	~~1695~~ 1665	~~495~~ 500	4/12	~~878~~ 838	18	1,894	3,577
~~Fertilizer~~	~~2070~~ 2031	~~415~~	~~10/19~~	~~1524~~			
~~Fertilizer~~	~~830~~ 815	~~85~~	~~10/15~~	~~584~~			
MACH. SHOP	~~18000~~ 18,078	~~6000~~ 6026	10/30	~~14660~~ 14,841	199	5,215	23,492
Grain	~~5490~~ 5515	930 927	— 10	~~4395~~ 4395	19	9,254	14,788
SHED	6000 6026	1000 1004	10/30	~~4333~~ 2671	53	2,173	8,252
Bale W	~~9720~~ 9764	1770 1778	— 10	~~1230~~ 1221	24	16,450	25,840
S. Rake	1140 1145	205 207	4/12	~~514~~ 570	10	1,523	2,678
~~Grain Cart~~	~~1555~~	~~205~~	~~10/19~~	~~1110~~			
~~Rake Mule~~	~~675~~	~~185~~	~~4/12~~	~~347~~			
Grain	18640 18750	4710 4741	2/14	~~6702~~ 6743	134	12,744	37,634
Sprayer	1745 1755	250 250	4/12	~~611~~ 619	12	1,793	3,158
~~Fertilizer~~	~~3005~~ 3017	~~870~~	~~10~~	~~830~~			
Disk	~~825~~ 823	~~207~~ 215	4/12	~~412~~ 421	8	1,004	1,845

57.

{[① - ②]÷③} + ④ = Annual

i = interest factor (previous page) as %
PMT = ①
N = k (previous page corresponding to above i of ①)
PV = ⑦

Mach. or Implement	① New Price	② Norm S.V.	③ Remaining useful years @ 11th year useful life	Normalized Value @ 11th yr	⑤ Salvage Value @ end of useful life	⑥ Total PV in "periods" 1 to k	⑦ Total PV initial price + PV for 1 to k + PV of subsequent
Pickup ½	~~5470~~ 5419	~~820~~ 521	4/8	~~3375~~ 3395	26	10,640	16,615
2 Truck #1	~~11760~~ 11,795	~~615~~ 3077	10/18	~~6856~~ 7920	60	6,121	17,976
~~2 Truck #2~~	~~15335~~ 15,335	~~615~~ 615	~~10/18~~	~~8656~~ 9221	67	—	—
125 hp	~~24335~~ 24,427	~~6675~~ 6677	2/14	~~9338~~ 9393	71	17,821	42,379
60 hp	~~18640~~ 18,720	3520 3542	4/12	~~8540~~ 8613	66	18,939	37,761
35 hp	9370 9373	670 665	— 20	~~620~~ 625	5	5,187	14,570
Plow	4140 4162	775 780	4/12	~~1785~~ 1907	15	4,210	8,387
R.H	3935 3954	985 989	— 10	~~905~~ 989	8	4,656	8,619
Cult	~~3105~~ 3122	~~930~~ 937	4/12	~~1640~~ 1665	13	2,720	5,855
Drill	~~3935~~ 3954	~~1035~~ 1041	4/16	~~1760~~ 1769	13	2,440	6,407
6. Dr	~~3345~~ 3330	~~910~~ 916	4/12	~~1704~~ 1721	13	3,005	6,348
B. & C. Plant	~~2795~~ 2810	~~630~~ 833	4/12	~~1476~~ 1492	11	2,461	5,282
Combine	~~4695~~ 4665	~~495~~ 500	4/12	~~878~~ 838	7	1,450	3,122
~~Fertilizer~~	~~2070~~ 2081	~~415~~	~~10/15~~	~~1524~~	7		
Trailer	830	85	10/15	584			
H.H. SHOP	18000 18,111	6000 6,032	10/50	~~14660~~ 14,741	76	3,583	21,737
Bldg	~~5490~~ 5,520	~~930~~ 935	— 10	~~2933~~ 2,949	7	7,189	12,711
SHED	6000 6,036	1000 1,006	— 10	~~4333~~ 4,357	20	1,493	7,539
Bldg #1	9320 9,374	1270 1,277	— 10	~~7220~~ 7,261	9	12,780	22,155
S. Bldg	1140 1,146	205 206	4/12	~~514~~ 517	4	1,166	2,315
Granary	1555	205	10/15	1110			
Pole Shed	675	165	4/12	317			
Tractor	18640 18,750	4710 4,736	2/14	~~6702~~ 6743	51	14,183	32,990
Grain	1395 1,403	200 201	4/12	~~611~~ 618	5	1,373	2,731
~~Trailer~~	~~3665~~ 3,687	~~830~~	— 10	~~630~~			
Disk	1,107	165	2/12	414	3	769	1,605

{[① - ②] × ③} + ④

Memo

Item	① Nom Price	② Nom S.V.	③ Remaining useful years till 4th year / useful life	④ Normalized value @ 100th yr 100th yr value	⑤ Salvage percent value		⑥ Total PV in "periods" 1 to k	⑦ ① + ⑥ + ⑤ Total PV initial price + PV for 1 to k + PV of 11th on
Pickup 1/2	~~5440~~ 5949	~~820~~ 831	4/8	~~3375~~ 3395	10		8,602	14,561
2 Truck bkh #1	11760 11,732	615 507	10/18	7920 ~~6656~~	23		4,677	16,495
~~2 Truck #2~~	~~15375~~ 15,385	~~615~~ 615	~~10/18~~	~~6656~~ 6221	26		—	—
125 hp	~~24375~~ 24,427	~~6675~~ 6677	2/14	~~9338~~ 7393	28		13,920	38,435
80 hp	16640 15,726	3520 3542	4/12	~~8510~~ 8613	26		14,975	33,757
35 hp	~~4320~~ 9378	~~670~~ 625	— 20	~~620~~ 625	2		3,928	13,308
Plow	4140 4162	775 780	4/12	~~1785~~ 1907	6		3,329	7,497
R.H	~~3935~~ 3934	985 927	— 10	~~905~~ 989	3		3,729	7,686
Cult	~~3105~~ 3122	~~930~~ 927	4/12	~~1648~~ 1665	5		2,151	5,278
Disk	3935 3934	1035 1041	4/16	~~1760~~ 1769	5		1,884	5,843
6. Dr	~~3315~~ 3311	910 916	4/12	~~1704~~ 1721	5		2,376	5,711
B. & C. Plant	2795 2810	830 833	4/12	~~1478~~ 1492	4		1,946	4,760
Cultiv	~~1695~~ 1665	~~495~~ 500	4/12	~~878~~ 328	3		1,147	2,815
~~Factory~~	~~2070~~ 2021	~~415~~	~~10/15~~	~~1524~~				
Tractor	830	85	10/15	584				
MK. SHOP	18000 18,011	6000 6002	12/30	~~4666~~ 4,661	30		2,527	20,635
Bale	~~5490~~ 5,495	~~930~~ 935	10	~~4560~~ 4,565	3		5,758	11,276
SHED	6000 6026	1000 1004	12/30	~~4333~~ 4,341	8		1,053	7,087
Bale II	~~9320~~ 9326	~~1220~~ 1222	10	~~7720~~ 7731	4		10,235	19,605
S. Rake	1140 1141	205 207	4/12	~~514~~ 520	2		922	2,069
Scraper	1555	205	12/15	1110				
2nd Bale	675	165	4/12	317				
Tractor	18640 18756	4710 4741	2/14	~~6702~~ 6743	20		11,078	29,854
Spring	1315 1323	250 250	4/12	611 618	2		1,086	2,444
~~Tractor~~	~~3005~~ 3017	~~870~~	~~10~~	~~830~~				
Cultiv	870 873	205 207	4/12	472 421	1		608	1442

① = initial value from previous page(s) on 1a
PMT = ② - ③
N = k (previous #s corresponding to those of ①)
PV = ?

QMG: 14 117
TB: 28 48 56 64 75 87 95 105 112
W.R. TABLE: AGRICULTURAL MACHINERY FIXED COSTS

DEPOSITION EXHIBIT 15 DORNBUSCH

AGRICULTURAL MACHINERY FIXED COSTS

	Machinery or Implement	Size	Years of Useful Life	Annual Miles or Hours of Use	Normalized Present Value	Annual Capital Cost	Annual Insurance Cost	Annual Fixed Cost	Hourly Fixed Cost
Vehicles:	Pickup Truck	½ ton -	8	6,000 mi.	19,606	784	20	804	.13
	Truck, Box & Hoist	2 ton -	18	7,500 mi.	20,202	808	45	853	.11
	~~Truck, for Spreader~~	~~2 ton~~	18	7,500 mi.	-	-	-	-	
Tractors:	2-Wheel Drive Duals	125 hp -	14	500	48,225	1929	94	2023	4.05
	2-Wheel Drive Duals	80 hp -	12	500	43,655	1746	66	1812	3.62
	2-Wheel Drive	30 hp -	20	500	16,420	657	30	687	1.37
Tillage Equipment:	Plow, 2-way	4-16's -	12	105	9,697	388	15	403	3.84
	Roller Harrow	15 ft.-	10	200	9,967	399	15	414	2.07
	Leveler	12 ft.-	12	200	6,706	268	12	280	1.40
	Disk, Tandem	14 ft.-	16	130	7,248	290	15	305	2.35
Planting Equipment:	Grain Drill	12 ft.-	12	65	7,288	292	13	305	4.69
	Bean & Corn Planter	6 row	12	65	6,052	212	11	253	3.89
Cultivating Equipment:	Cultivator	6 row	12	200	3,577	143	6	149	0.75
	~~Rotary Hoe~~	15 ft.	15	200	-			-	-
	~~Tine Harrow~~	18 ft.	15	130	-			-	-
Harvest Equipment:	Baler, PTO, Twine	14x18 -	10	360	14,788	592	19	611	1.70
	Bale Wagon	3 ton -	10	360	25,840	1,034	32	1066	2.96
	Side Rake	8 ft. -	12	130	2,678	107	4	111	0.85
	~~Bean Cutter~~	~~6-row~~	15	130					
	~~Red Weeder~~	~~12-ft.~~	12	130					
	Swather, SP	14 ft. -	14	360	37,634	1505	70	1575	4.38
Miscellaneous Equipment:	Sprayer, 300 gal.	30 ft. -	12	200	3,158	126	5	131	0.66
	~~Front Loader~~	~~2-ton~~	10	200	-		-		
	Blade	8 ft.	12	80	1,845	74	3	77	0.96

*Dollars per mile.

Improvements: Shop 40×50 — 8,252 — 330 + 21 = 351 ÷ 1.10
Machine Shed 40×60 — 23,492 — 940 — 72 — 1,012 — 3.16

QMG: 14 117
TB: 28 48 56 64 75 87 95 105 112
W.R. TABLE: AGRICULTURAL MACHINERY FIXED COSTS

AGRICULTURAL MACHINERY FIXED COSTS

Machinery or Implement		Size	Years of Useful Life	Annual Miles or Hours of Use	Normalized Present Value	Annual Capital Cost	Annual Insurance Cost	Annual Fixed Cost	Hourly Fixed Cost
Vehicles:	Pickup Truck	½ ton	8	6,000 mi.	16,615	831	20	851	.14
	Truck, Box & Hoist	2 ton	18	7,500 mi.	17,976	899	45	944	.13
	~~Truck, for Spreader~~	~~2 ton~~	18	7,500 mi.	-	-	-	-	-
Tractors:	2-Wheel Drive Duals	125 hp	14	500	42,379	2119	94	2213	4.43
	2-Wheel Drive Duals	80 hp	12	500	37,761	1888	66	1954	3.91
	2-Wheel Drive	30 hp	20	500	14,570	729	30	759	1.52
Tillage Equipment:	Plow, 2-way	4-16's	12	105	8,387	419	15	434	4.14
	Roller Harrow	15 ft.	10	200	8,618	431	15	446	2.23
	Leveler	12 ft.	12	200	5,855	293	12	305	1.52
	Disk, Tandem	14 ft.	16	130	6,407	320	15	335	2.58
Planting Equipment:	Grain Drill	12 ft.	12	65	6,348	317	13	330	5.08
	Bean & Corn Planter	6 row	12	65	5,282	264	11	275	4.23
Cultivating Equipment:	Cultivator	6 row	12	200	3,122	156	6	162	0.81
	~~Rotary Hoe~~	~~15 ft.~~	15	200	-				
	~~Tine Harrow~~	~~18 ft.~~	15	130					
Harvest Equipment:	Baler, PTO, Twine	14x18	10	360	12,711	636	19	655	1.82
	Bale Wagon	3 ton	10	360	22,155	1108	32	1140	3.17
	Side Rake	8 ft.	12	130	2,315	116	4	120	.92
	~~Bean Cutter~~	~~6 row~~	15	130					
	~~Red Weeder~~	~~12 ft.~~	12	130					
	Swather, SP	14 ft.	14	360	32,990	1650	70	1720	4.78
Miscellaneous Equipment:	Sprayer, 300 gal.	30 ft.	12	200	2,731	137	5	142	.71
	~~Front Loader~~	~~2 ton~~	10	200	-				
	~~Blade~~	~~8 ft.~~	12	80	1,605	80	3	83	1.04
	Improvements: Shop			40 x 50	7,539	371	21	398	1.24
	Machine Shed A			40 x 60	21,737	1087	72	1159	3.62

*Dollars per mile.

QMG: 14 117
TB: 28 48 56 64 75 87 95 105 112
W.R. TABLE: AGRICULTURAL MACHINERY FIXED COSTS

AGRICULTURAL MACHINERY FIXED COSTS

Machinery or Implement	Size	Years of Useful Life	Annual Miles or Hours of Use	Normalized Present Value	Annual Capital Cost	Annual Insurance Cost	Annual Fixed Cost	Hourly Fixed Cost
Vehicles: Pickup Truck	½ ton -	8	6,000 mi.	14,561	874	20	894	.15
Truck, Box & Hoist	2 ton -	18	7,500 mi.	16,495	990	45	1035	.14
~~Truck, for Spreader~~	~~2 ton~~	18	7,500 mi.	-		-		-
Tractors: 2-Wheel Drive Duals	125 hp -	14	500	38,435	2,306	94	2400	4.80
2-Wheel Drive Duals	80 hp -	12	500	33,757	2,025	66	2091	4.18
2-Wheel Drive	30 hp -	20	500	13,308	798	30	828	1.66
Tillage Equipment: Plow, 2-way	4-16's -	12	105	7,497	450	15	465	4.43
Roller Harrow	15 ft.-	10	200	7,686	461	15	476	2.38
Leveler	12 ft.-	12	200	5,278	317	12	329	1.64
Disk, Tandem	14 ft.-	16	130	5,843	351	15	366	2.81
Planting Equipment: Grain Drill	12 ft.-	12	65	5,711	343	13	356	5.47
Bean & Corn Planter	6 row	12	65	4,760	286	11	297	4.56
Cultivating Equipment: Cultivator	6 row	12	200	2,815	169	6	175	.87
~~Rotary Hoe~~	~~15 ft.~~	15	200	-				-
~~Tine Harrow~~	~~18 ft.~~	15	130	-				-
Harvest Equipment: Baler, PTO, Twine	14x18 -	10	360	11,276	677	19	696	1.93
Bale Wagon	3 ton -	10	360	19,605	1176	32	1208	3.36
Side Rake	8 ft. -	12	130	2,069	124	4	128	.99
~~Bean Cutter~~	~~6 row~~	15	130					
~~Rod Weeder~~	~~12 ft.~~	12	130					
Swather, SP	14 ft. -	14	360	29,854	1791	70	1861	5.17
Miscellaneous Equipment: Sprayer, 300 gal.	30 ft. -	12	200	2,441	146	5	151	.76
~~Front Loader~~	~~2 ton~~	10	200	-				
~~Blade~~	~~8 ft.~~	12	80	1,442	87	3	90	1.12
Improvements: Shop	40x50	30		7,087	425	21	446	1.39
Machine Shed	40x60	30		20,635	1235	72	1310	4.09

*Dollars per mile.

QMG: 14 117
TB: 28 48 56 64 75 87 95 105 112
W.R. TABLE: AGRICULTURAL MACHINERY FIXED COSTS

AGRICULTURAL MACHINERY FIXED COSTS

	Machinery or Implement	Size	Years of Useful Life	Annual Miles or Hours of Use	Normalized Present Value	Annual Capital Cost	Annual Insurance Cost	Annual Fixed Cost	Hourly Fixed Cost
Vehicles:	Pickup Truck	½ ton	8	6,000 mi.	12,926	921	20	941	.16 *
	Truck, Box & Hoist	2 ton	18	7,500 mi.	15,152	1094	45	1139	.16 * .15
	~~Truck, for Spreader~~	~~2 ton~~	18	7,500 mi.	21,336	1520	48	1568	.21 *
Tractors:	2-Wheel Drive Duals	125 hp	14	500	35,127	2503	94	2596	5.19 5.22
	2-Wheel Drive Duals	80 hp	12	500	30,408	2167	66	2233	4.47 4.53
	2-Wheel Drive	30 hp	20	500	12,247	873	30	902	1.80 1.81
Tillage Equipment:	Plow, 2-way	4-16's	12	105	6,759	482	15	497	4.73 4.76
	Roller Harrow	15 ft.	10	200	6,909	492	15	507	2.54 2.55
	Leveler	12 ft.	12	200	4,798	342	12	354	1.77 1.78
	Disk, Tandem	14 ft.	16	130	5,379	383	15	398	3.06 3.08
Planting Equipment:	Grain Drill	12 ft.	12	65	5,187	370	13	382	5.88 5.92
	Bean & Corn Planter	6 row	12	65	4,375	308	11	319	4.91 4.94
Cultivating Equipment:	Cultivator	6 row	12	200	2,554	182	6	189	.94 .95
	~~Rotary Hoe~~	15 ft.	15	200	2,985	213	7	220	1.10 1.11
	~~Tine Harrow~~	18 ft.	15	130	1,242	88	3	91	.70 .71
Harvest Equipment:	Baler, PTO, Twine	14x18	10	360	10,026	719	19	738	2.05 2.06
	Bale Wagon	3 ton	10	360	17,484	1246	32	1277	3.55 3.57
	Side Rake	8 ft.	12	130	1,866	133	4	137	1.05
	~~Bean Cutter~~	~~6 row~~	15	130	2,301	164	5	* 169	1.30
	~~Rod Weeder~~	~~12 ft.~~	12	130	1,056	75	3	78	.60
	Swather, SP	14 ft.	14	360	27,230	1940	70	2010	5.58 5.61
Miscellaneous Equipment:	Sprayer, 300 gal.	30 ft.	12	200	2,197	157	5	161	.81
	~~Front Loader~~	~~2 ton~~	10	200	5,198	370	12	382	1.91 1.92
	Blade	8 ft.	12	80	1,311	93	3	97	1.21 1.22

*Dollars per mile.

TABLE 2

GROSS RETURNS, PRODUCTION COSTS, AND NET RETURNS, BY CROP
WIND RIVER RESERVATION, WYOMING
(Annual Dollars Per Acre)

Crop	Gross Returns		Production Costs	Net Returns	
	Lowland	Highland		Lowland	Highland
Malt Barley	297.50 ~~251.43~~	270.40 ~~224.21~~	143.26	154.24	127.14
Nurse Barley	264.92 ~~224.33~~	240.59 ~~199.82~~	147.08	117.90	93.51
Alfalfa	246.68 ~~258.41~~	225.48 ~~226.61~~	77.59	169.09	147.89
Corn Silage	318.00	—	172.68	145.32	—
Corn Grain	235.72 ~~248.23~~	—	149.50	86.22	—

4.62

TABLE 3

CROPPING PATTERN, AND WEIGHTED AVERAGE ANNUAL NET RETURNS, PER ACRE WIND RIVER RESERVATION, WYOMING

Crop	Lowland		Highland	
	Percent Distribution	Net Return	Percent Distribution	Net Return
Malting Barley	5		17	
Nurse Malt Barley	16		16	
Alfalfa	67		67	
Corn Silage	3			
Corn Grain	9			
Weighted Average Net Returns		151.99		135.66

TABLE 4

NET BENEFITS OF IRRIGATED AGRICULTURE BY PROJECT AREA, PER ACRE
WIND RIVER RESERVATION, WYOMING

Project Area	Percent Lowland	Percent Highland	Average Annual Net Return	Annual On-Farm Irrigation O & M Cost	Project Area Net Benefit Per Acre Annual	Project Area Net Benefit Per Acre Present Value
North Crowheart	81.6% -81.9%	18.4% 18.1%	148.99	4.84	144.15	3604
South Crowheart	100%	—	151.99	5.65	146.34	3659
Bighorn Flats	91.4% 91.2%	8.6% 8.8%	150.59	5.06	145.53	3638
Riverton East	100%	—	151.99	5.72	146.27	3657
Arapahoe	100%	—	151.99	5.27	146.72	3668

TABLE 5

COMPARISON OF ECONOMIC COSTS AND BENEFITS FOR IRRIGATED AGRICULTURE BY PROJECT AREA

WIND RIVER RESERVATION, WYOMING

Project Area	Net Returns* (Dollars)	System Costs* (Dollars)	Benefit-Cost Ratio
North Crowheart	3604	2194	1.64
South Crowheart	3659	2678	1.37
Bighorn Flats	3638	3106	1.17
Riverton East	3657	2619	1.40
Arapahoe	3668	2107	1.74

*Net Returns and

DEPOSITION EXHIBIT 17 Dorsett

TABLE 2

GROSS RETURNS, PRODUCTION COSTS, AND NET RETURNS, BY CROP
WIND RIVER RESERVATION, WYOMING
(Annual Dollars Per Acre)

Crop	Gross Returns Lowland	Gross Returns Highland	Production Costs	Net Returns Lowland	Net Returns Highland
Malt Barley	297.50 ~~251.43~~	270.40 ~~224.21~~	146.31	151.19	124.09
Nurse Barley	264.98 ~~224.33~~	240.59 ~~199.82~~	149.72	115.26	90.87
Alfalfa	246.68 ~~258.41~~	225.48 ~~226.61~~	79.74	166.94	145.74
Corn Silage	318.00	—	175.41	142.59	—
Corn Grain	235.72 ~~248.23~~	—	152.69	83.03	—

TABLE 3

CROPPING PATTERN, AND WEIGHTED AVERAGE ANNUAL NET RETURNS, PER ACRE
WIND RIVER RESERVATION, WYOMING

Crop	Lowland		Highland	
	Percent Distribution	Net Return	Percent Distribution	Net Return
Malting Barley				
Nurse Malt Barley				
Alfalfa				
Corn Silage				
Corn Grain				
Weighted Average Net Returns		149.60		133.28

TABLE 4

NET BENEFITS OF IRRIGATED AGRICULTURE BY PROJECT AREA, PER ACRE
WIND RIVER RESERVATION, WYOMING

Project Area	Percent Lowland	Percent Highland	Average Annual Net Return	Annual On-Farm Irrigation O & M Cost	Project Area Net Benefit Per Acre	
					Annual	Present Value
North Crowheart	81.6% 81.9%	17.4% 18.1%	146.60	4.84	141.76	2885
South Crowheart	100%	—	149.60	5.65	143.95	2929
Bighorn Flats	91.4% 91.2%	8.6% 8.8%	148.20	5.06	143.14	2913
Riverton East	100%	—	149.60	5.72	143.88	2928
Arapahoe	100%	—	149.60	5.27	144.33	2937

TABLE 5

COMPARISON OF ECONOMIC COSTS AND BENEFITS FOR IRRIGATED AGRICULTURE BY PROJECT AREA

WIND RIVER RESERVATION, WYOMING

Project Area	Net Returns* (Dollars)	System Costs* (Dollars)	Benefit-Cost Ratio
North Crowheart	2885	1995	1.45
South Crowheart	2929	2402	1.22
Bighorn Flats	2913	2710	1.07
Riverton East	2928	2326	1.26
Arapahoe	2937	1935	1.52

*Net Returns and

DEPOSITION EXHIBIT 18 DORNBUSCH

TABLE 2

GROSS RETURNS, PRODUCTION COSTS, AND NET RETURNS, BY CROP
WIND RIVER RESERVATION, WYOMING
(Annual Dollars Per Acre)

Crop	Gross Returns		Production Costs	Net Returns	
	Lowland	Highland		Lowland	Highland
Malt Barley	297.50 ~~251.43~~	270.40 ~~224.21~~	148.93	148.57	121.47
Nurse Barley	264.95 ~~224.33~~	240.59 ~~199.82~~	152.72	112.26	87.87
Alfalfa	246.68 ~~258.41~~	225.48 ~~226.61~~	81.86	164.82	143.62
Corn Silage	318.00	—	178.42	139 58	—
Corn Grain	235.72 ~~248.23~~	—	155.14	80.58	—

TABLE 3

CROPPING PATTERN, AND WEIGHTED AVERAGE ANNUAL NET RETURNS, PER ACRE
WIND RIVER RESERVATION, WYOMING

Crop	Lowland		Highland	
	Percent Distribution	Net Return	Percent Distribution	Net Return
Malting Barley				
Nurse Malt Barley				
Alfalfa				
Corn Silage				
Corn Grain				
Weighted Average Net Returns		147.26		130.93

TABLE 4

NET BENEFITS OF IRRIGATED AGRICULTURE BY PROJECT AREA, PER ACRE
WIND RIVER RESERVATION, WYOMING

Project Area	Percent Lowland	Percent Highland	Average Annual Net Return	Annual On-Farm Irrigation O & M Cost	Project Area Net Benefit Per Acre	
					Annual	Present Value
North Crowheart	81.6% 81.9%	12.4% 18.1%	144.26	4.84	139.42	2387
South Crowheart	100%	—	147.26	5.65	141.61	2424
Bighorn Flats	91.4% 91.2%	8.6% 8.8%	145.86	5.06	140.80	2410
Riverton East	100%	—	147.26	5.72	141.54	2423
Arapahoe	100%	—	147.26	5.27	141.99	2431

TABLE 5

COMPARISON OF ECONOMIC COSTS AND BENEFITS FOR IRRIGATED AGRICULTURE BY PROJECT AREA

WIND RIVER RESERVATION, WYOMING

Project Area	Net Returns* (Dollars)	System Costs* (Dollars)	Benefit–Cost Ratio
North Crowheart	2387	1871	1.28
South Crowheart	2424	2221	1.09
Bighorn Flats	2410	2448	.98
Riverton East	2423	2134	1.14
Arapahoe	2431	1825	1.33

*Net Returns and

Fair 81.

DEPOSITION EXHIBIT 19 Dorn Busch

— Annual —

On-farm irrigation costs — operation and maintenance

Project	N Crow	S Crow	BHF	Riv E	Arap
% of acres served by hand-move systems	% 3.9	6.1	5.0	4.2	4.7
% acres served by side-roll	% 96.1	93.9	95.0	95.8	95.7
hand-move O&M costs $/acre (79 normalized)	$ 5.90	6.92	5.91	7.03	6.23
side-roll O&M costs $/acre (79 normalized)	$ 4.80	5.57	5.01	5.66	5.20
weighted average O&M costs	4.84	5.65	5.06	5.72	5.27

SIDE-ROLL
ON-FARM IRRIGATION SYSTEM
OPERATION & MAINT. COSTS
(DOLLARS PER ACRE PER YEAR)

[#'s in parentheses are costed labor]

PROJECT	NCROW	SCROW	BHF	ARAP	RIVE
Repair and Maint	2.50	2.96	2.68	2.74	2.82
Labor to reset	(7.20) 1.44	(8.85) 1.77	(7.75) 1.45	(7.70) 1.54	(9.40) 1.80
Subtotal 1	(9.70) 3.94	(11.81) 4.73	(9.93) 4.13	(10.44) 4.28	(11.82) 4.6
Misc Overhead 5% on fuel, costed labor subtl 1	.49	.59	.50	.52	.59
* Interest on Cash (20) (.25) (.30) (.36) 3 9/16% on op costed labor subtl 1 plus Misc OH	.16 (.09 .11 .13)	(.44) .19	(.37) .16	(.39) .17	(.44) .19
Subtotal 2	(10.55) 4.59	(12.84) 5.51	(10.80) 4.79	(11.35) 4.97	(12.85) 5.4
Management 2% of fuel, costed labor in subtl 2	.21	.26	.22	.23	.26
Total	4.80 (4.73)	5.57	5.01	5.20	5.66

HAND-MOVE
ON-FARM IRRIGATION SYSTEM
OPERATION & MAINT. COSTS
(DOLLARS PER ACRE PER YEAR)

PROJECT	NCROW	SCROW	BHF	ARAP	RIVE
Repair and Maint.	1.30	1.30	1.30	1.30	1.30
Labor to reset	(15.90) 3.18	(19.55) 3.91	(16.00) 3.20	(17.05) 3.41	(19.90) 3.98
Subtotal	(17.20) 4.48	(20.85) 5.21	(17.30) 4.50	(18.35) 4.71	(21.20) 5.28
Misc Overhead	.86	1.04	.87	.92	1.06
Interest on Cash	(.64) .19	(.78) .22	(.65) .19	(.69) .20	(.79) .23
Subtotal	(18.70) 5.53	(22.67) 6.47	(18.82) 5.56	(19.96) 5.83	(23.05) 6.
Management	.37	.45	.38	.40	.41
Total	5.90	6.92	5.94	6.23	7.0

reclaimed land - Underwood

DEPOSITION EXHIBIT 20 D0

acres

new alfalfa — stand of hays 4.5-5.0 ton expected for '81

Underground tile drains — spring '77 or fall '76

only - no other amendments

2 tons Hi-Cal/acre to 6 tons — fall '77

planted 3 yrs — '78 ests not good yield 35-40 bu. '79 & '80 Barley 50 bu. 72 lbs. wait crop Corn Nurse crop Alf

pH was up range 7.4—7.6

less than 2 acres won't take seed

Sandy loam - same as rest

- why? -

gypsum "Tacky"

tel Dan

shale -

reclaimed hay fields - very poor

Alkali soil - ? medicinal tap

0-52-0 ?

2 tons Hi-Cal/acre - by hand - by hand

Elemental sulfur - by hand - by hand 3 sacks/acre

Ammonium sulfate

12-3 tons/acre upto 20 tons in chicken yard

Corn 7.2-7.6

tel Dan

Cont.

as much as
acres - 1/2 yrs. in row

Hx 80# releases phosphates in soil

Crops

Straight Rag — alf. hay 4.0 tons (in 2 cuttings)
not always mixed w barley total farm =

even 1st yr — no big deal

W/out small grains get 2.5 tons alfalfa 1st yr
can't spray barley to get rid of weeds.
Last will plant barley this yr — new barley
needs cover crop - deep field.

2 ton loads of acid - Black from wash out lines in
refineries, get some residue — OK
get trace elements, some lead but not much.
Sid settles to bottom — so don't drain tanks
to bottom

Does Hixon all ground as matter of practice.
Neither stated on new reading because
of soil treatment
Clem — 6 days on same area — exceptional test-
Rogers - high quality alfalfa

Normalized Price

(from Wolo)

Installation Costs	No Crowheart	So Crowheart	Bighorn Flats	Riverton East	Arapahoe
1 On Farm Systems	125	148	134	141	137
2. Pipe Networks	349	246	299	261	335
3. Pumps & Pumping Plt.	179	299	530	341	112
4. Canals & Structures	252	334	⊖	196	330
5. Drainage	165	195	171	173	249
6. 25 % Contin. & Eng (1-2-5)					
7. Fencing	9	10	14	12	20
8. Land Prep					
9. Discount for Time ⊖					
Installation					
Operation Costs					
10. OM & R	6.84	12.43	7.63	12.43	12.43
11. Energy	9.98	19.35	30.90	20.40	4.35
12. Power	1.91	3.45	5.96	3.68	0.75
Operation					
13. Total Instal. & Operation					

w/ Adjustments

DEPOSITION EXHIBIT 22 Dorzbach

Installation Costs	No Crowheart	So Crowheart	Bighorn Flats	Riverton East	Arapahoe
1 On Farm Systems	194	230	208	219	213
2 Pipe Networks	383	269	328	287	367
3 Pumps & Pumping Plt.	191	318	565	363	119
4 Canals & Structures	225	298	~~0~~	175	294
5 Drainage	141	167	146	148	214
6. 25% Contng & Eng (42-5)	235	263	261	243	249
7 Fencing (1.5%)	11	12	17	15	25
8. Land Prep	30	30	30	30	30
9 Discount to Time ~~0~~	132	75	73	70	71
Installation					
Operation Costs					
10. OM & E	63	87	87	87	87
11 Energy	145	281	449	296	63
12. Power	28	50	87	53	11
Operation					
13 Total Install. & Operation	1778	2080	2251	1986	1743

Installation Costs	No Crowheart	So Crowheart	Bighorn Flats	Riverton East	Arapahoe
1 On Farm Systems $(1+i)^{n-1}$	281	333	301	317	308
2. Pipe Networks	484	341	416	363	465
3. Pumps & Pumping Plt.	250	418	740	476	156
4. Canals & Structures	225	298	~~0~~	175	294
5. Drainage	141	167	146	148	214
6. ~~25~~ Contng & Eng (12-5)	275	306	326	291	282
7 Fencing	14	15	22	19	33
8. Land Prep	30	30	30	30	30
9 Discount to Time ~~0~~	87	50	52	48	47
Installation Operation Costs					
10. OM & R 15%	109	150	151	150	150
11. Energy	250	484	773	510	109
12. Power	48	86	149	92	19
Operation					
13. Total Install. & Operation	2194	2678	3106	2619	2107

Installation Costs	No Crowheart	So Crowheart	Bighorn Flats	Fierton East	Arapahoe
1 On Farm Systems 1.05	240	285	258	272	264
2 Pipe Networks	435	307	373	326	418
3 Pumps & Pumping Plt.	222	371	657	423	139
4 Canals & Structures	225	298	⊖	175	294
5 Drainage	141	167	146	148	214
6. ~~3.5~~ 5% Contng & Eng (#2-5)	256	286	294	268	266
7 Fencing	13	14	20	17	29
8. Land Prep	30	30	30	30	30
9 Discount for Time ⊖	102	58	59	55	55
Installation					
Operation Costs					
10. OM & R 1.05	89	122	123	122	122
11. Energy	203	394	629	415	89
12. Power	39	70	121	75	15
Operation					
13. Total Install. & Operation	1995	2402	2710	2326	1935

Installation Costs	No Crowheart	So. Crowheart	Bighorn Flats	Riverton East	Arapahoe
1 On Farm Systems	214	254	230	242	235
2 Pipe Networks	406	286	347	303	389
3. Pumps & Pumping Plnt.	204	341	604	389	128
4 Canals & Structures	225	298	⊖	175	294
5. Drainage	141	167	146	148	214
6. 25% Contng & Eng (42-5)	244	273	274	254	256
7 Fencing	12	13	18	16	27
8. Land Prep	30	30	30	30	30
9 Discount to Time ⊖	116	66	65	62	62
Installation & Operation Costs					
10. OM&R	75	103	103	103	103
11. Energy	171	331	529	349	74
12. Power	33	59	102	63	13
Operation					
13. Total Install. & Operation	1871	2221	2448	2134	1875

Edw. Ex.

Fencing

[Assume no Salvage value]

Installation cost : $1440/mile

life : 25 years

Annual Repair cost : $13/mile

[Use Valued at opportunity cost]

PROJECT	NCRNL	SCRNL	BHF	APAP	AVE
FENCE MILES	242	32	26	41	32
ACRES	38764	4751	2670	3936	3815
MILES PER ACRE	.0062	.0067	.0097	.0142	.0084
DOLLARS PER ACRE (CURRENT)	8.93	9.65	13.97	20.45	12.10
INSTALLATION					
ANNUAL REPAIR	.08	.09	.13	.18	.11

neglegible

STATUS OF IRRIGATION SCHEDULING TECHNOLOGY AND ITS APPLICATION IN THE U.S.A.[1/]

By

Marvin E. Jensen[2/]

INTRODUCTION

Irrigation water management involves all aspects of obtaining, storing, transporting, and uniformly applying water to replenish the plant available soil water reservoir to maximize returns from the input of all capital, physical and human resources associated with irrigation. On-farm irrigation water management, more specifically, is managing the plant available soil water reservoir in each cropped field to essentially eliminate water as a production limiting input resource if water costs are low or fixed. Water deliveries to complete the irrigation of each field must be scheduled within the capacity constraints of the farm system and/or the flow available to the farm. Also, irrigations must be planned to distribute the available water supply throughout the crop season. This requires an assessment of expected evapotranspiration (ET) rates and rainfall.

Irrigation scheduling is predicting the optimum time and amount of the next one or two irrigations, taking into account expected precipitation, the available water supply, and the capacity of the delivery system. In practice, it is estimating the earliest date that an efficient irrigation can be applied with the existing system without causing adverse effects on crop growth, and the latest date that an irrigation can be applied before crop yield and/or quality are reduced because of inadequate soil water. Within this period, irrigation and other cultural practices are planned to achieve the management objectives. When water supplies are limited, or its costs are high, irrigations are scheduled to maximize net returns per unit of water.

Irrigation scheduling technology considers rainfall and ET since the last irrigation, the allowable soil water depletion at the present growth stage, and the expected ET and rainfall before the next irrigation. Irrigation scheduling is a decision-making process that farm managers encounter daily, and better decisions can be made if the right kind of current information is readily available.

Irrigation scheduling is now also being used to achieve other management objectives in addition to those listed above. It is being used for electrical load management to reduce or control the peak electrical demand. Farmers and districts operating under a load management program receive lower energy charges. Less energy consumption also may result.

1/ Contribution from the USDA, Science and Education Administration, Federal Research. Prepared for the American Agricultural Economics Association Symposium on Crop Response to Irrigation, Blacksburg, Virginia, August 7-9, 1978. (Condensed from a recent paper by Jensen, 1978.)

2/ Director, Snake River Conservation Research Center, Route 1, Box 186, Kimberly, Idaho 83341.

USBUREC

.6 Comparability. Project benefits and costs occur in diverse physical forms, at different times, and over varying periods of time. It is necessary to bring the measurable effects to a common basis of measurement to permit summation and comparison of benefits and costs. The common denominator is expressed in terms of market prices or assigned dollar values expected to prevail at the time when benefits or costs occur.

.7 Price Levels. Price levels for project evaluation should reflect the exchange values of the goods and services involved, consistent with assumed general price levels for the period of analysis. Long-term projected prices reflect relatively high national employment, increasing population, continued economic growth, and a stable general price level, with production and requirements in balance under competitive conditions. Deferred or recurring benefits and costs should be measured at average long-term prices representative of the period of analysis. Current prices should be used for investment costs to be incurred in the near future. When benefits are based on alternative cost, the price level should be that expected to prevail at the time when the costs would occur. The Commissioner's Office, Washington, will periodically establish national projections of long-range prices for use by field offices in making adjustments to reflect area and regional price levels (see Subparagraph 116.1.6A), and will also periodically establish the basis for prices to be used in estimating costs of operation, maintenance, and replacement (see Subparagraph 116.1.6F). Cooperating agencies will be responsible for determining the price levels appropriate for the estimates of benefits and costs of those purposes for which they have major responsibility.

.8 Period of Analysis. The period of analysis for benefits and costs shall be the expected economic life of the project or 100 years beyond the initial date of service, whichever is shorter. Selection of this limit prevents planning for a restricted scale of development such as an irrigation water supply that would fail within one or two generations. The national interest in resource development includes long-range investment for the benefit of future generations, and Reclamation projects include durable structures having long periods of physical and economic life.

.9 Interest Rate. Benefits and costs occurring at different times are adjusted to comparable values for the period of analysis by the use of an interest or discount rate. The rate to be used will be furnished periodically by the Commissioner's Office, Washington (see Subparagraph 116.1.6E), and will generally be based on the expected average long-term Federal borrowing rate. It does not represent an opportunity cost or a risk allowance, but is intended to reflect a public rate of time preference applicable to the high capital intensity and extended economic life of resource development projects. The interest rate shall be used in determining interest during construction, annual equivalent project costs, and annual equivalent project benefits.

.10 Taxes. Federal, State, and local taxes shall be used in estimating benefits, alternative cost, separable cost, and economic project cost in cases where the alternative project for power or municipal and industrial water would be privately financed.

.11 Principles of Measurement. Costs and benefits are measured by the difference in future conditions with and without the existence of the proposed project plan. The objective of benefit-cost analysis is to demonstrate that the proposed plan is economically justified as a Federal undertaking. It is, therefore, necessary to determine the amount of Federal cost and the amount of benefits comparable with that cost. Benefits attributable to Federal project costs will exclude those attributable to private costs and to non-Federal public costs. Benefits and costs should be measured to comparable extent, with compatible standards of measurement, and for a common period of analysis.

.12 Irrigat

A. Di fr is bu ne ea fr fi

B. In ot p: o: to d: v:

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